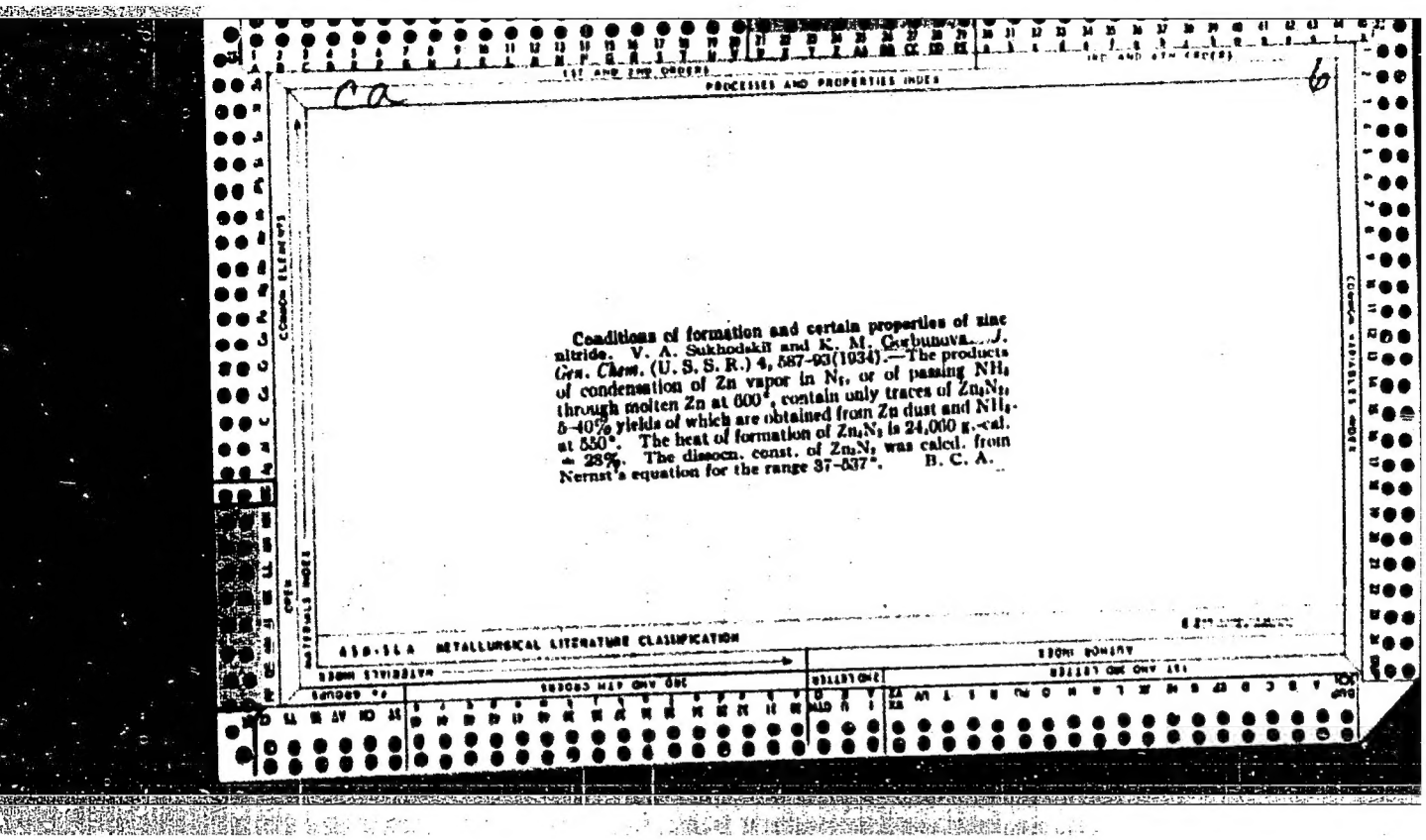
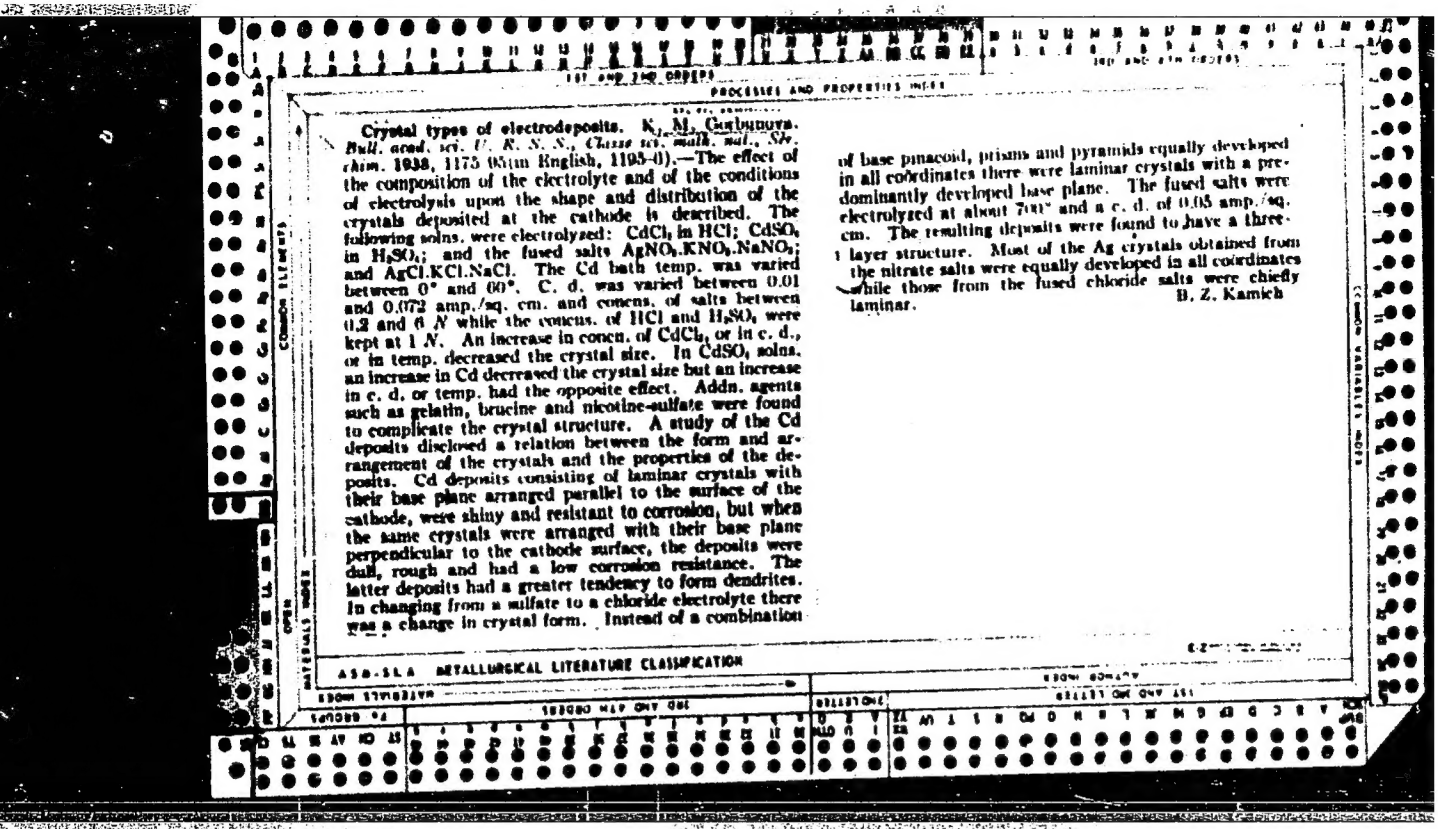


Ca

PROCESSES AND PROPERTIES INDEX

6

Conditions of formation and certain properties of zinc nitride. V. A. Sukhodskii and K. M. Gorbunova. *J. Gen. Chem.* (U. S. S. R.) 4, 587-93(1934).—The products of condensation of Zn vapor in N_2, or of passing NH_3 through molten Zn at 600°, contain only traces of Zn_3N_2; 5-40% yields of which are obtained from Zn dust and NH_3 at 550°. The heat of formation of Zn_3N_2 is 24,000 g.-cal. ± 28%. The dissocn. const. of Zn_3N_2 was calcd. from Nernst's equation for the range 37-537°. B. C. A.

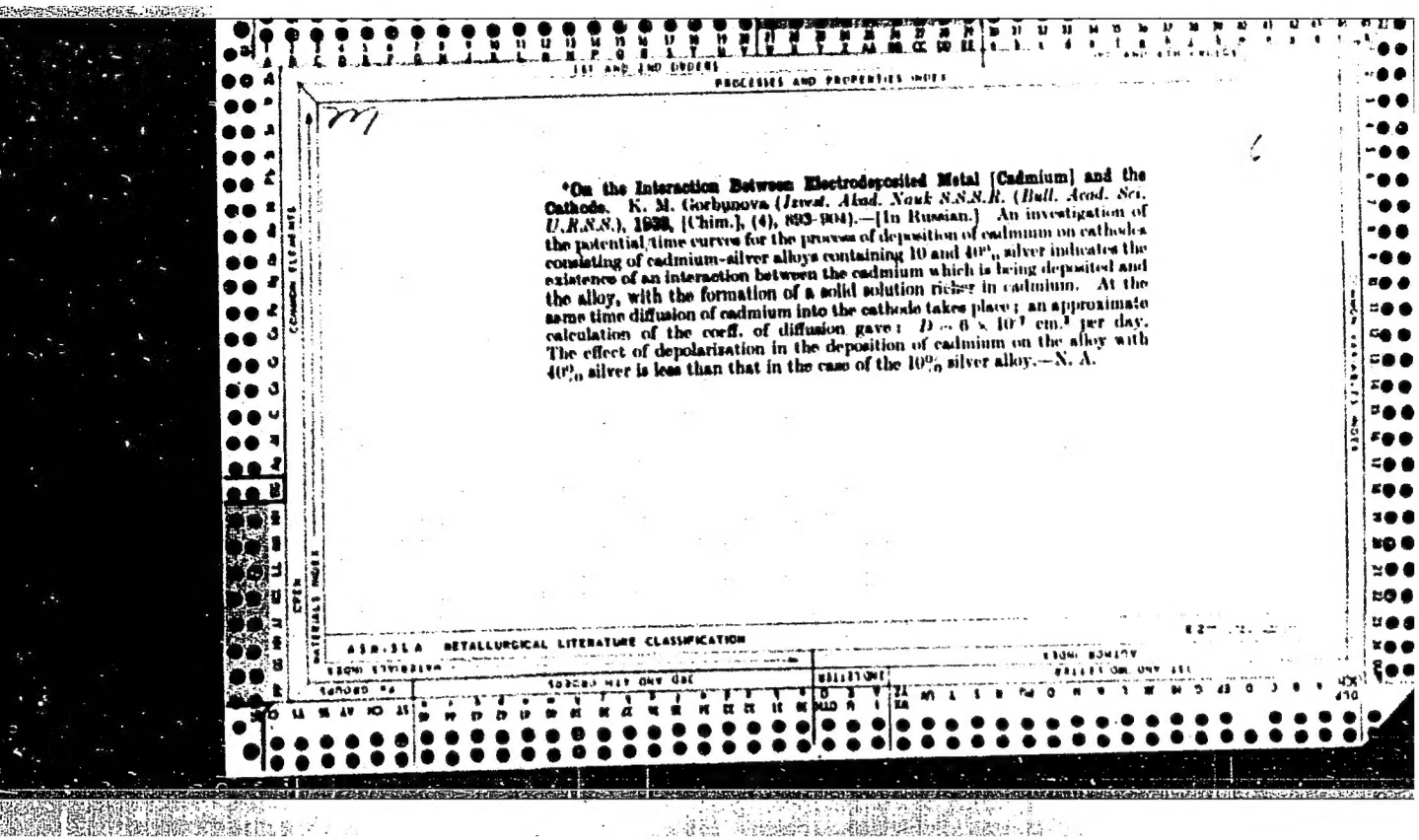


PROCESSES AND PROPERTIES INDEX

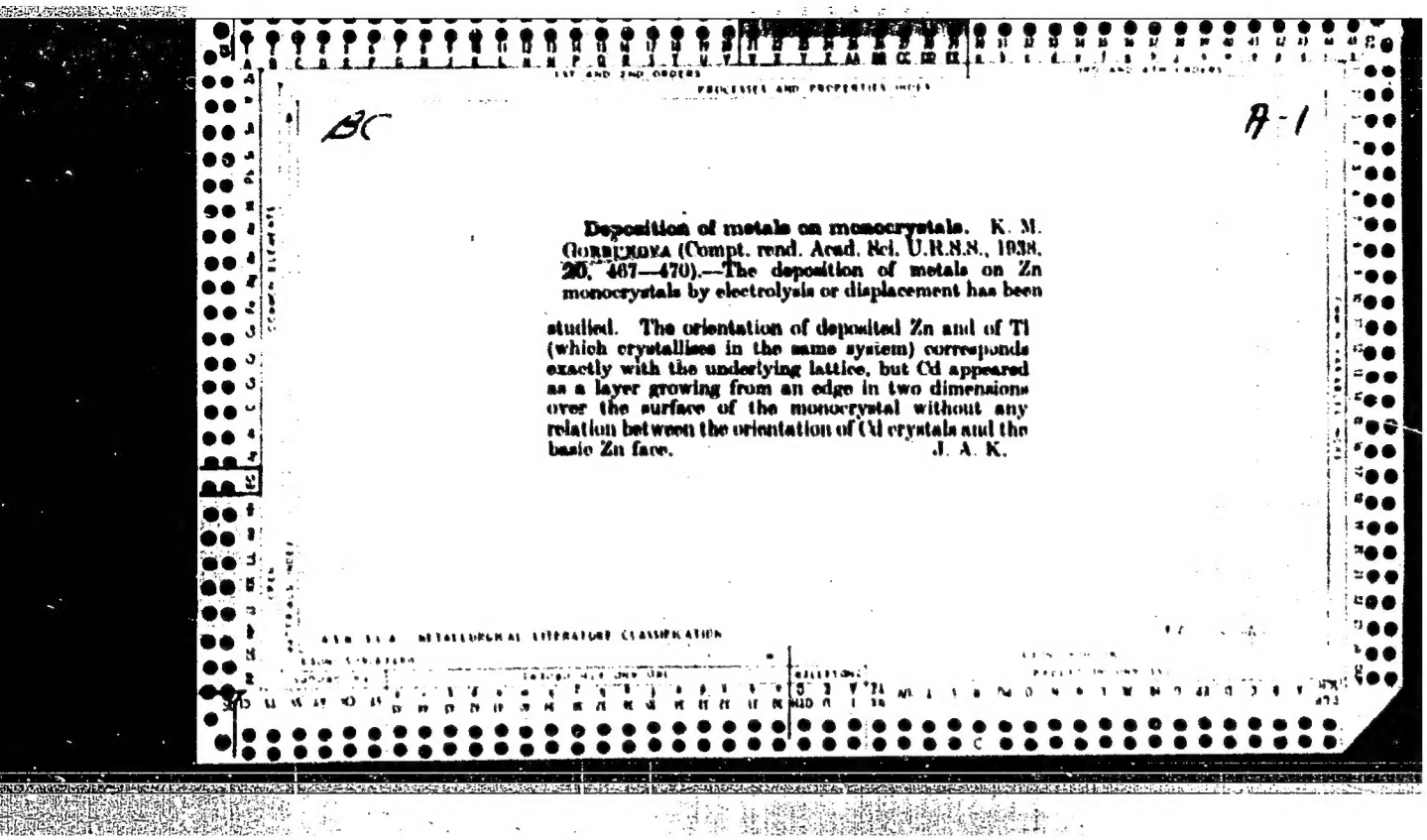
Crystal types of electrodeposits. K. M. Gorbunova. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* 1938, 1175-95(in English, 1195-6).—The effect of the composition of the electrolyte and of the conditions of electrolysis upon the shape and distribution of the crystals deposited at the cathode is described. The following solns. were electrolyzed: $CdCl_2$ in HCl; $CdSO_4$ in H_2SO_4; and the fused salts $AgNO_3$.KNO_3.$NaNO_3$; and AgCl.KCl.NaCl. The Cd bath temp. was varied between 0° and 60°. C. d. was varied between 0.01 and 0.072 amp./sq. cm. and concns. of salts between 0.2 and 6 *N* while the concns. of HCl and H_2SO_4 were kept at 1 *N*. An increase in concn. of $CdCl_2$ or in c. d., or in temp. decreased the crystal size. In $CdSO_4$ solns. an increase in Cd decreased the crystal size but an increase in c. d. or temp. had the opposite effect. Addn. agents such as gelatin, brucine and nicotine-sulfate were found to complicate the crystal structure. A study of the Cd deposits disclosed a relation between the form and arrangement of the crystals and the properties of the deposits. Cd deposits consisting of laminar crystals with their base plane arranged parallel to the surface of the cathode, were shiny and resistant to corrosion, but when the same crystals were arranged with their base plane perpendicular to the cathode surface, the deposits were dull, rough and had a low corrosion resistance. The latter deposits had a greater tendency to form dendrites. In changing from a sulfate to a chloride electrolyte there was a change in crystal form. Instead of a combination of base pinacoid, prisms and pyramids equally developed in all coördinates there were laminar crystals with a predominantly developed base plane. The fused salts were electrolyzed at about 700° and a c. d. of 0.05 amp./sq. cm. The resulting deposits were found to have a three-layer structure. Most of the Ag crystals obtained from the nitrate salts were equally developed in all coördinates while those from the fused chloride salts were chiefly laminar.

B. Z. Kamich

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION



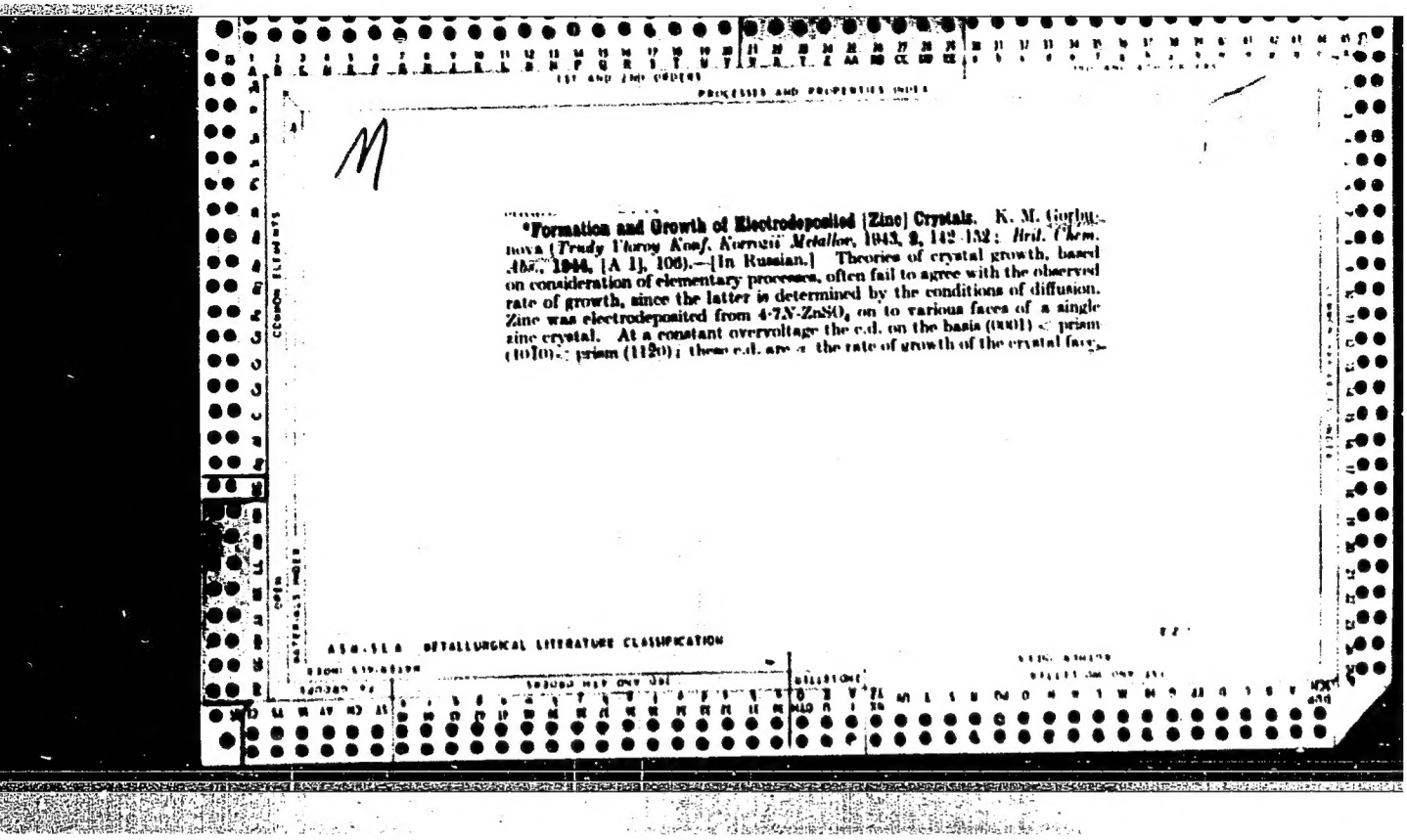
***On the Interaction Between Electrodeposited Metal [Cadmium] and the Cathode.** K. M. Gorbunova (*Izvest. Akad. Nauk S.S.S.R.* (*Bull. Acad. Sci. U.R.S.S.*), **1938**, [Chim.], (4), 893–904).—[In Russian.] An investigation of the potential/time curves for the process of deposition of cadmium on cathodes consisting of cadmium-silver alloys containing 10 and 40% silver indicates the existence of an interaction between the cadmium which is being deposited and the alloy, with the formation of a solid solution richer in cadmium. At the same time diffusion of cadmium into the cathode takes place; an approximate calculation of the coeff. of diffusion gave: $D = 6 \times 10^{-7}$ cm.^{2} per day. The effect of depolarisation in the deposition of cadmium on the alloy with 40% silver is less than that in the case of the 10% silver alloy.—N. A.



BC

A-1

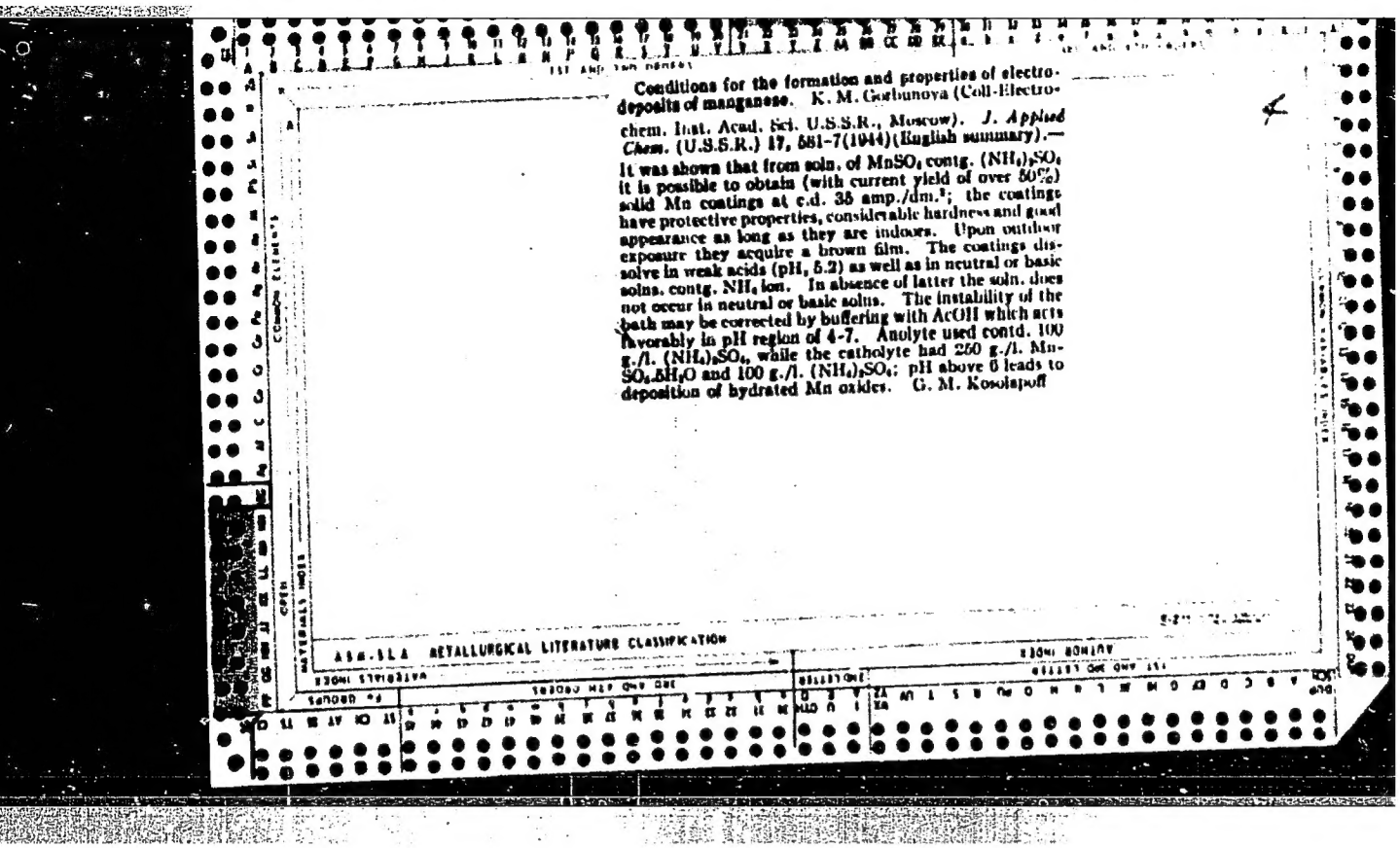
Deposition of metals on monocrystals. K. M. GORBUNOVA (Compt. rend. Acad. Sci. U.R.S.S., 1938, 20, 467—470).—The deposition of metals on Zn monocrystals by electrolysis or displacement has been studied. The orientation of deposited Zn and of Tl (which crystallises in the same system) corresponds exactly with the underlying lattice, but Cd appeared as a layer growing from an edge in two dimensions over the surface of the monocrystal without any relation between the orientation of Cd crystals and the basic Zn face. J. A. K.



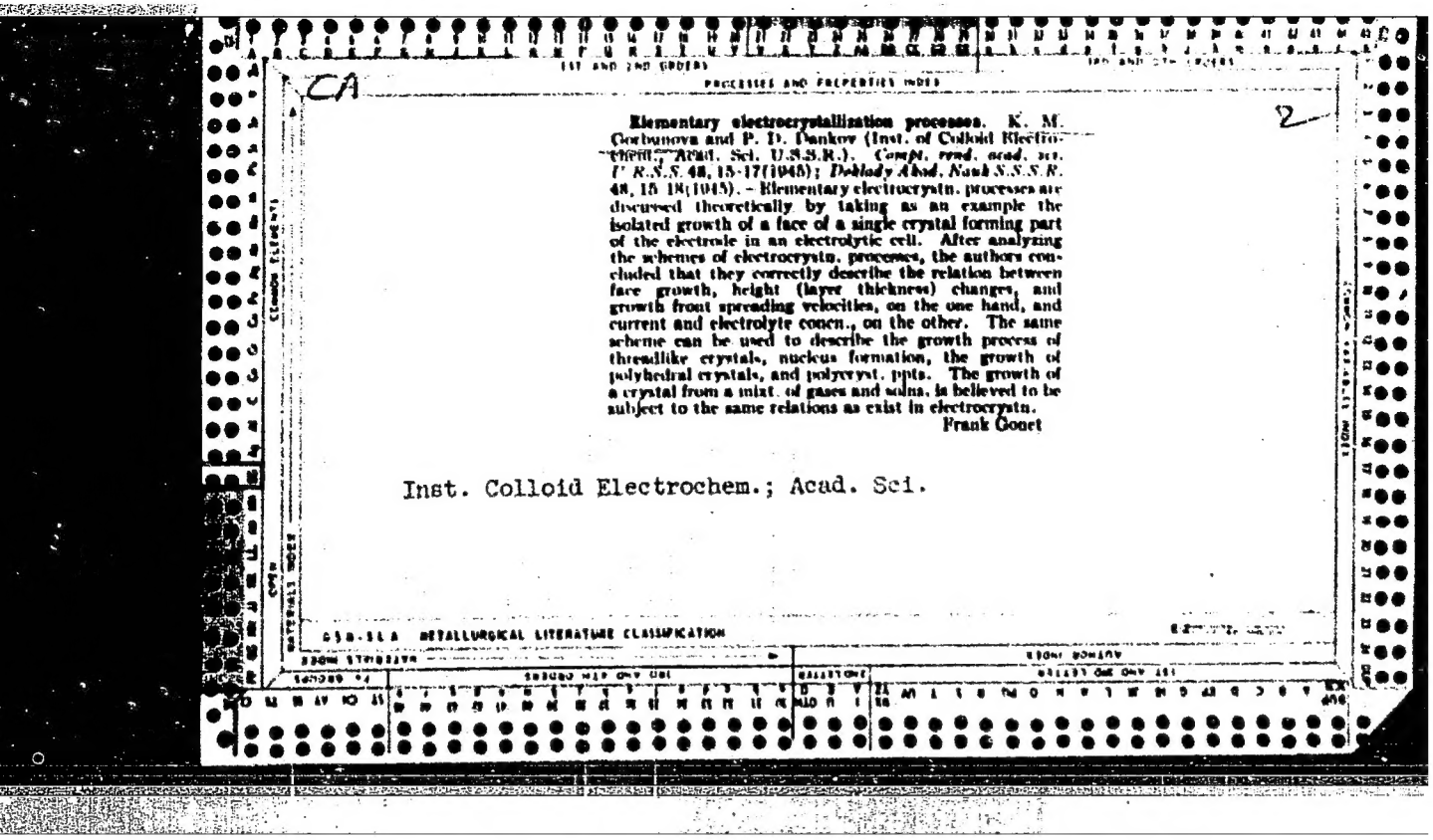
M

*Formation and Growth of Electrodeposited [Zinc] Crystals. K. M. Gorbunova (*Trudy Vtoroy Konf. Kristall. Metallov*, 1943, **2**, 142–152; *Brit. Chem. Abs.*, 1944, [A 1], 108).—[In Russian.] Theories of crystal growth, based on consideration of elementary processes, often fail to agree with the observed rate of growth, since the latter is determined by the conditions of diffusion. Zinc was electrodeposited from 4·7*N*-$ZnSO_4$ on to various faces of a single zinc crystal. At a constant overvoltage the c.d. on the basis (0001) < prism (10$\bar{1}$0) < prism (11$\bar{2}$0); these c.d. are ∝ the rate of growth of the crystal faces.

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION



Conditions for the formation and properties of electrodeposits of manganese. K. M. Gorbunova (Coll.-Electrochem. Inst. Acad. Sci. U.S.S.R., Moscow). *J. Applied Chem.* (U.S.S.R.) 17, 581-7(1944)(English summary).—It was shown that from soln. of $MnSO_4$ contg. $(NH_4)_2SO_4$ it is possible to obtain (with current yield of over 80%) solid Mn coatings at c.d. 38 amp./dm.^{2}; the coatings have protective properties, considerable hardness and good appearance as long as they are indoors. Upon outdoor exposure they acquire a brown film. The coatings dissolve in weak acids (pH, 5.2) as well as in neutral or basic solns. contg. NH_4 ion. In absence of latter the soln. does not occur in neutral or basic solns. The instability of the bath may be corrected by buffering with AcOH which acts favorably in pH region of 4-7. Anolyte used contd. 100 g./l. $(NH_4)_2SO_4$, while the catholyte had 260 g./l. $MnSO_4.5H_2O$ and 100 g./l. $(NH_4)_2SO_4$; pH above 6 leads to deposition of hydrated Mn oxides. G. M. Kosolapoff



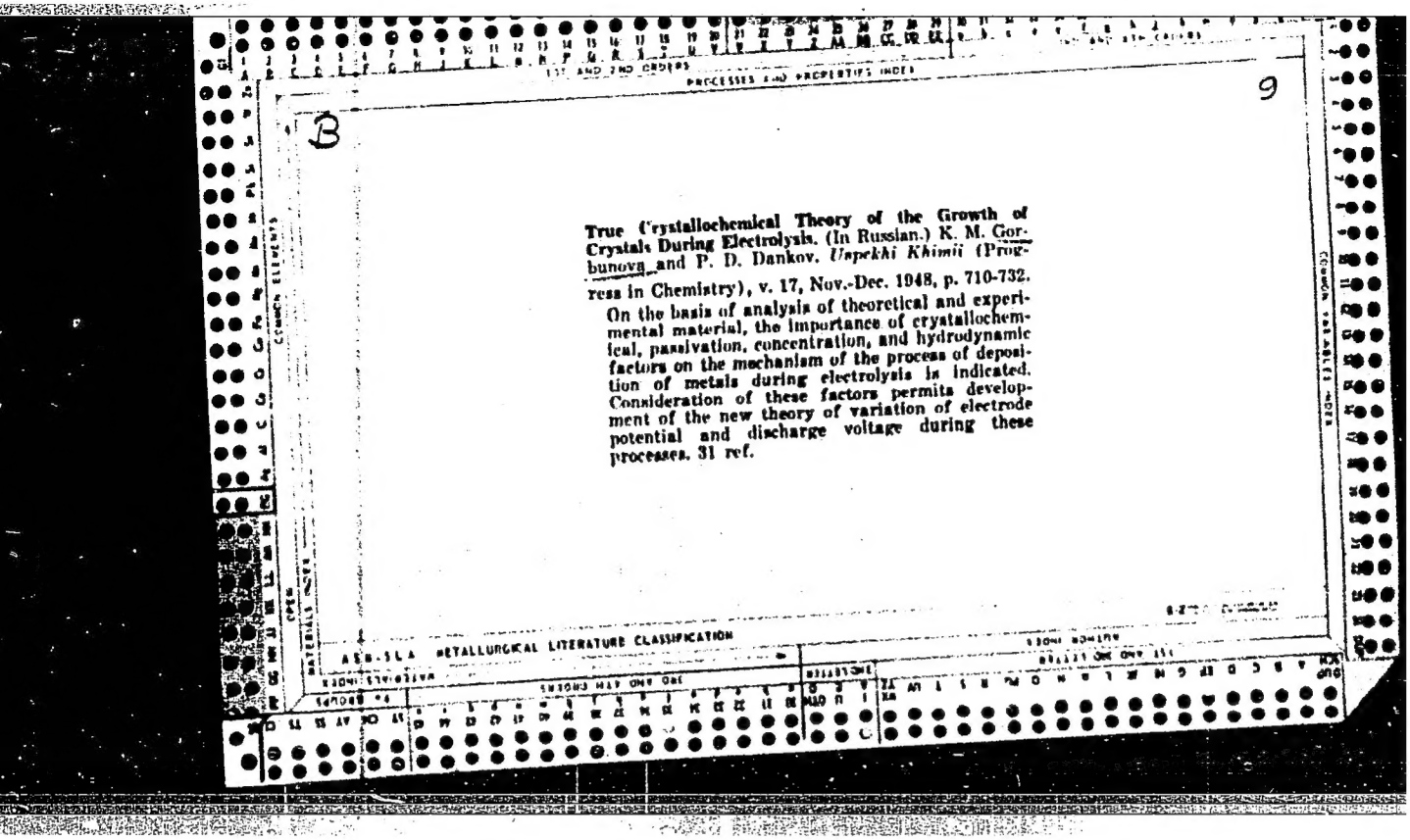
CA

2

Elementary electrocrystallization processes. K. M. Gorbunova and P. D. Dankov (Inst. of Colloid Electrochem., Acad. Sci. U.S.S.R.). *Compt. rend. acad. sci. U.R.S.S.* 48, 15-17(1945); *Doklady Akad. Nauk S.S.S.R.* 48, 15-18(1945). – Elementary electrocrystn. processes are discussed theoretically by taking as an example the isolated growth of a face of a single crystal forming part of the electrode in an electrolytic cell. After analyzing the schemes of electrocrystn. processes, the authors concluded that they correctly describe the relation between face growth, height (layer thickness) changes, and growth front spreading velocities, on the one hand, and current and electrolyte concn., on the other. The same scheme can be used to describe the growth process of threadlike crystals, nucleus formation, the growth of polyhedral crystals, and polycryst. ppts. The growth of a crystal from a mixt. of gases and solns. is believed to be subject to the same relations as exist in electrocrystn.

Frank Gonet

Inst. Colloid Electrochem.; Acad. Sci.



PROCESSES AND PROPERTIES INDEX

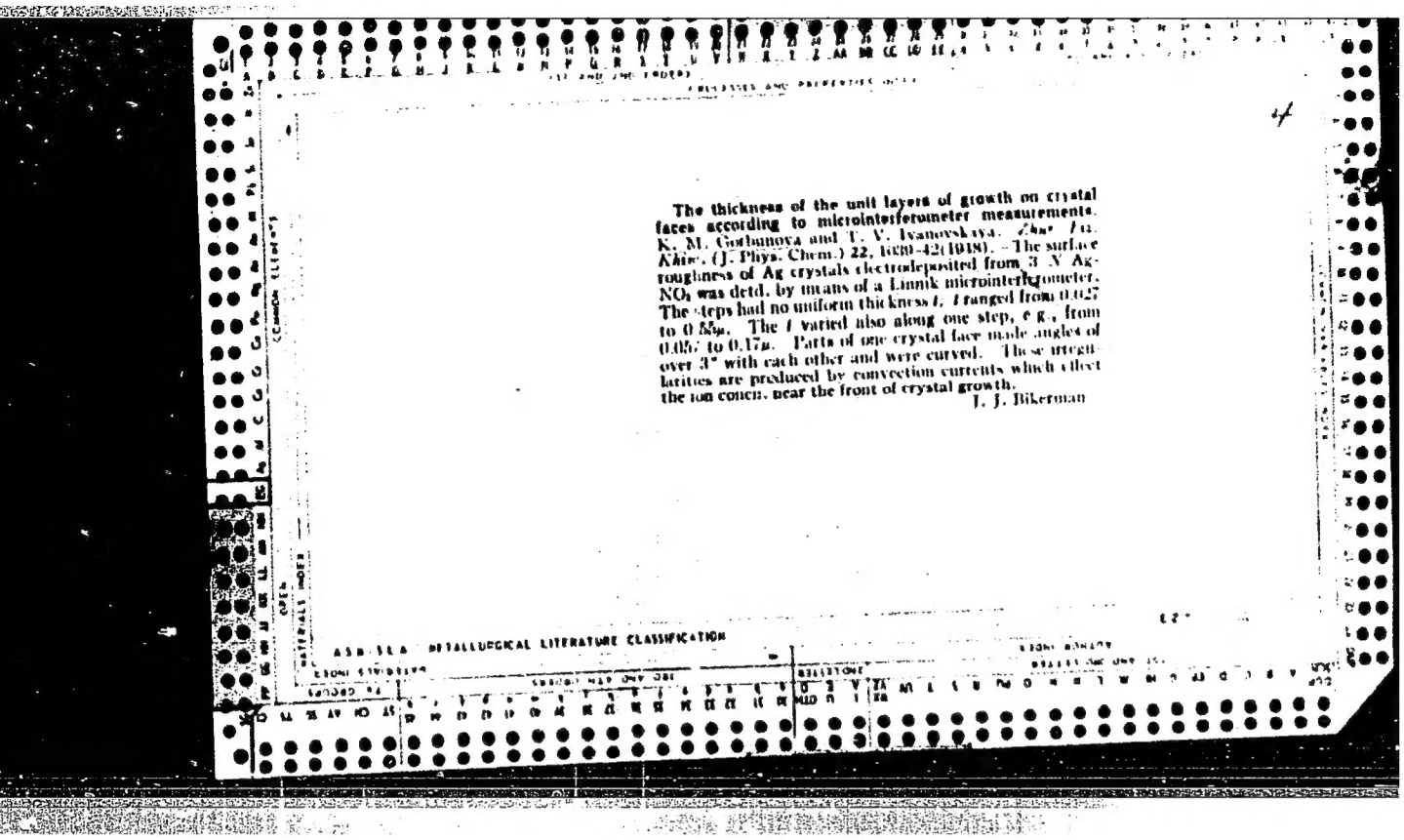
9

B

True Crystallochemical Theory of the Growth of Crystals During Electrolysis. (In Russian.) K. M. Gorbunova and P. D. Dankov. *Uspekhi Khimii* (Progress in Chemistry), v. 17, Nov.-Dec. 1948, p. 710-732.

On the basis of analysis of theoretical and experimental material, the importance of crystallochemical, passivation, concentration, and hydrodynamic factors on the mechanism of the process of deposition of metals during electrolysis is indicated. Consideration of these factors permits development of the new theory of variation of electrode potential and discharge voltage during these processes. 31 ref.

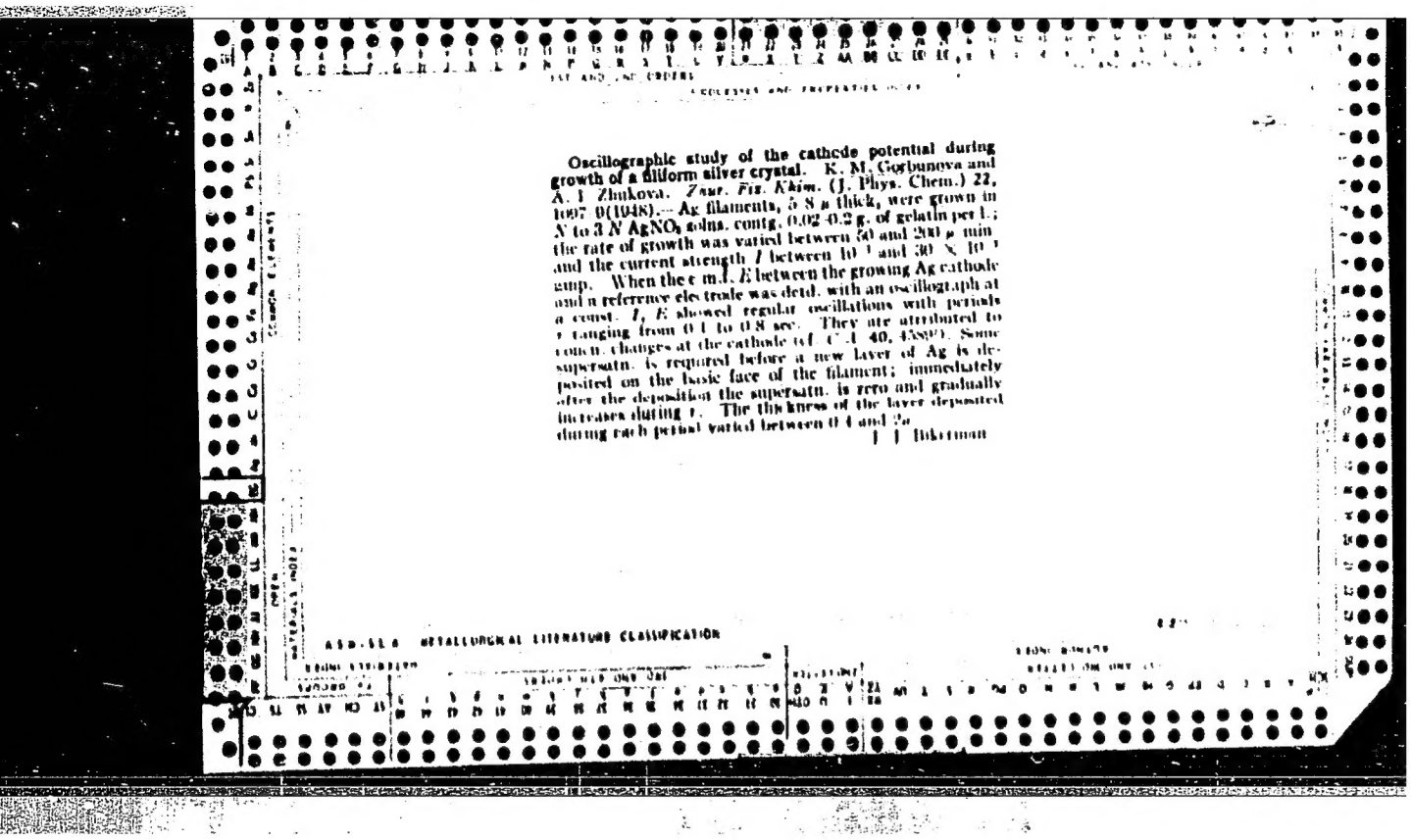
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



The thickness of the unit layers of growth on crystal faces according to microinterferometer measurements. K. M. Gorbunova and T. V. Ivanovskaya. Zhur. Fiz. Khim. (J. Phys. Chem.) 22, 1080-42(1948). – The surface roughness of Ag crystals electrodeposited from 3 N $AgNO_3$ was detd. by means of a Linnik microinterferometer. The steps had no uniform thickness l, l ranged from 0.027 to 0.45μ. The l varied also along one step, e.g., from 0.05 to 0.17μ. Parts of one crystal face made angles of over 3° with each other and were curved. These irregularities are produced by convection currents which affect the ion concn. near the front of crystal growth.

J. J. Bikerman

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION



Oscillographic study of the cathode potential during growth of a filiform silver crystal. K. M. Gorbunova and A. I. Zhukova. *Zhur. Fiz. Khim.* (J. Phys. Chem.) 22, 1097–9(1948).— Ag filaments, 5–8 μ thick, were grown in *N* to 3 *N* $AgNO_3$ solns. contg. 0.02–0.2 g. of gelatin per l.; the rate of growth was varied between 50 and 200 μ/min. and the current strength *I* between 10^{-3} and 30×10^{-3} amp. When the e.m.f. *E* between the growing Ag cathode and a reference electrode was detd. with an oscillograph at a const. *I*, *E* showed regular oscillations with periods τ ranging from 0.1 to 0.8 sec. They are attributed to concn. changes at the cathode (cf. *C.A.* 40, 4590⁸). Some supersatn. is required before a new layer of Ag is deposited on the basic face of the filament; immediately after the deposition the supersatn. is zero and gradually increases during τ. The thickness of the layer deposited during each period varied between 0.4 and 2 μ.

I. I. Bikerman

GORBUNOVA, K. M.

USSR/Physics May 49
Crystallization
Filaments, Silver

"Crystallization Mechanisms of Thin Silver Filaments," K. M. Gorbunova, A. I. Zhukova, Inst of Phys Chem, Acad Sci USSR, Lab of Structure of Surface Films, Moscow, 10 1/2 pp

"Zhur Fiz Khim" Vol XXIII, No 5

Determines increase in rate of elongation of thread-like crystals of silver during a decrease in the current of the cell to be as much as 2.5 times. Considerable increase of I/S (I-current, S-filament section) is not

[redacted] 58/49T97

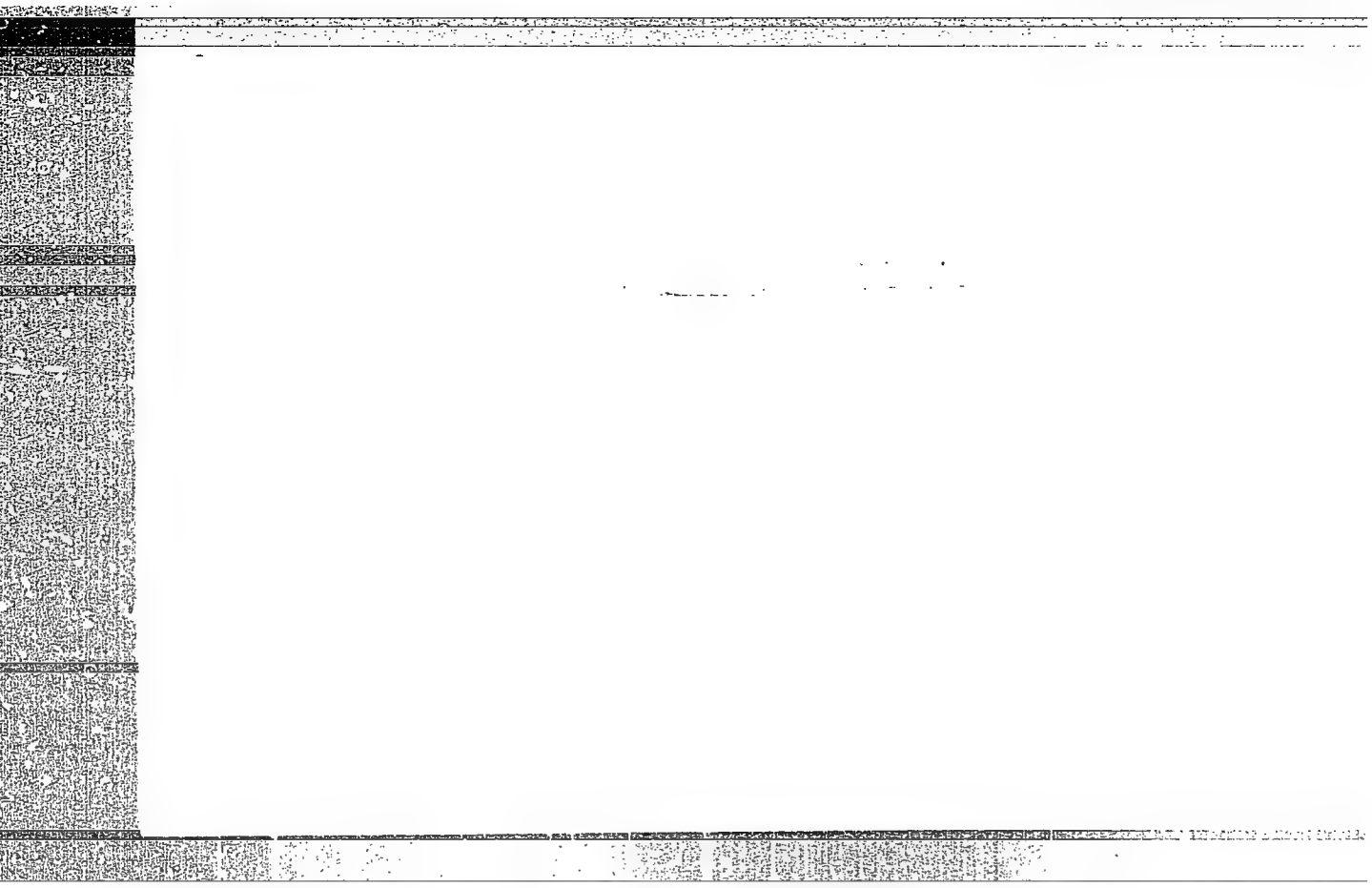
USSR/Physics (Contd) May 49

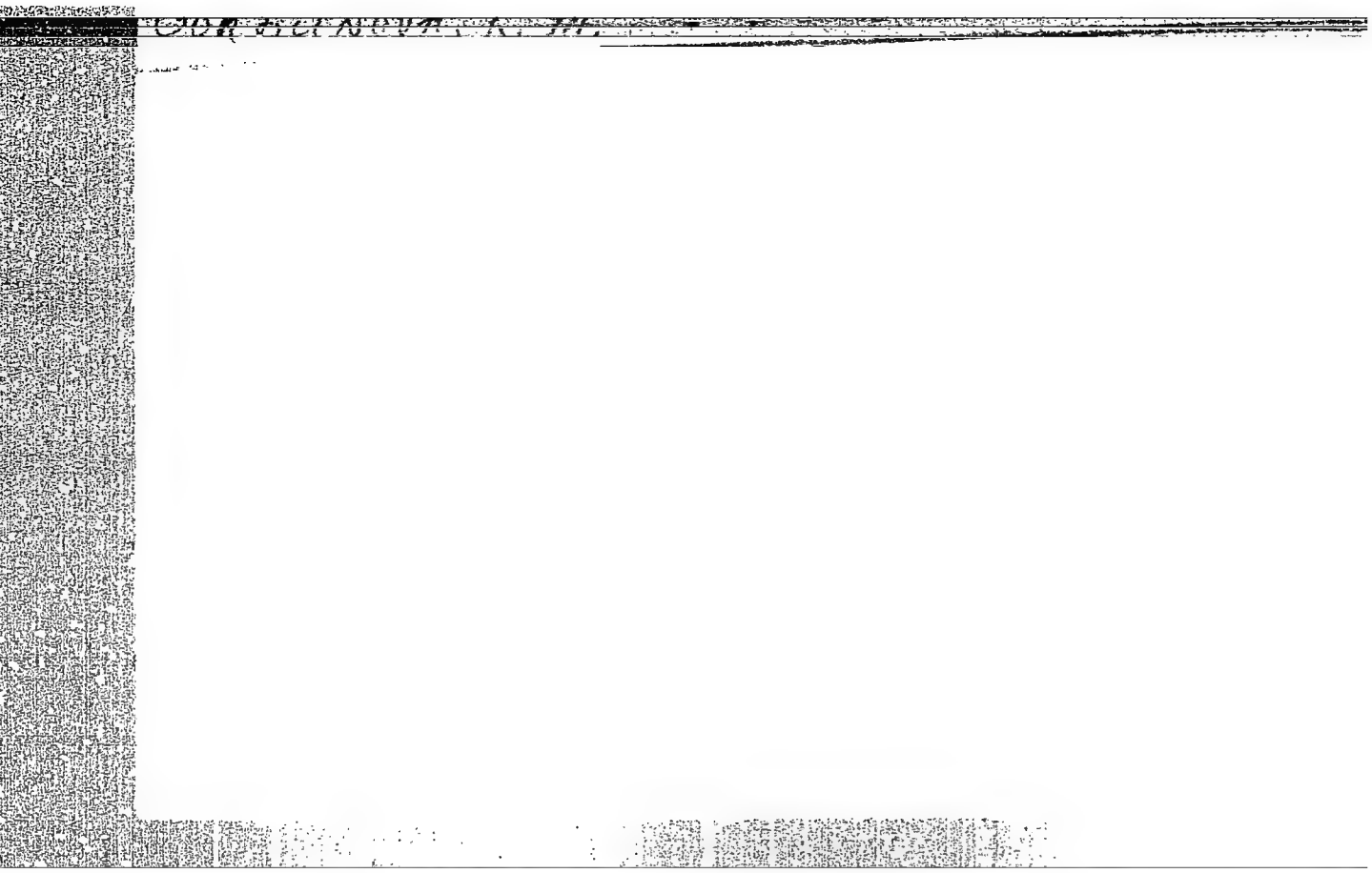
accompanied by a similar increase in the potential of the cathode. Observed relationship of the disturbance in uniformity of I/S with light currents to the nature of surface-active impurities, their concentrations, and the concentration of $AgNO_3$ is studied. A new form of crystalline filament with depressed crystalline characteristics is also studied, as well as high and low ranges of regular crystallization and their relation to the conditions of electrolysis. Includes pictures. Submitted 21 Jul 48.

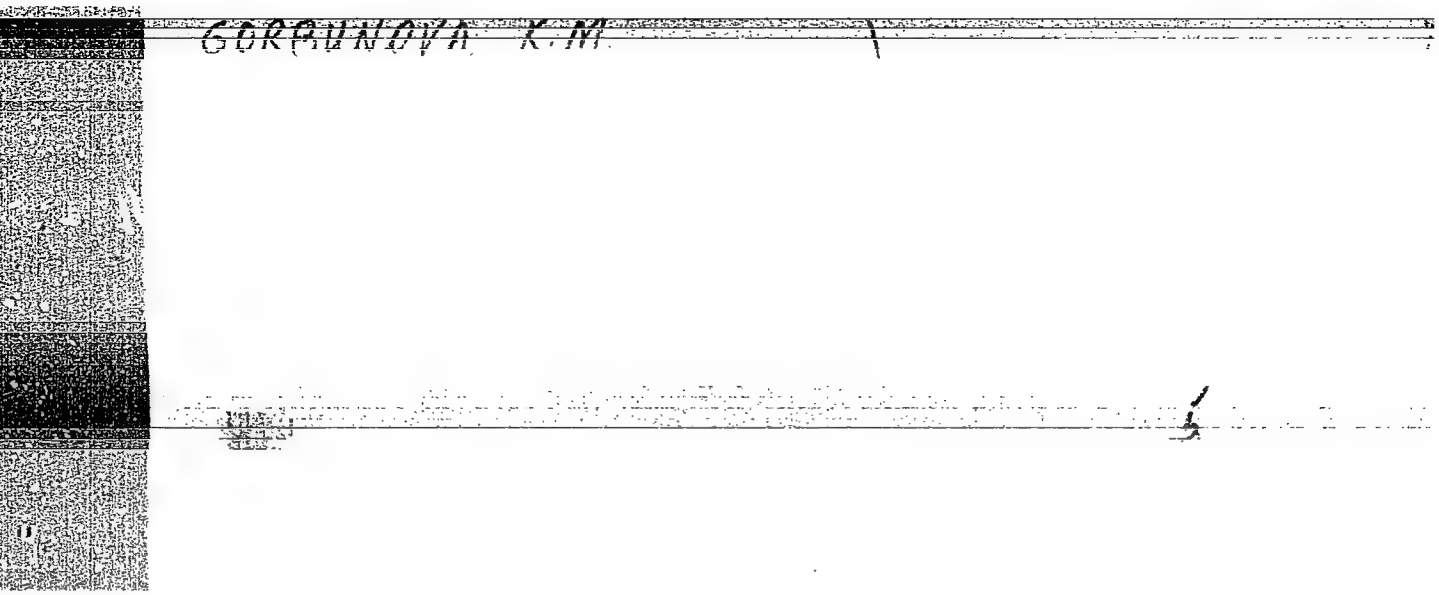
[redacted] 58/49T97

Met. Abstract

Crystal-Chemical and Diffusion Mechanism of Electro-Crystallization (of silver). K.M. Gorbunova and P.D. Dankov (Zhur. Fiz. Khim., 1949, 23, (5), 616-624).- In Russian.) G. and D. first consider theoretically the electrolytic growth of filiform Ag crystals from soln. as the current is suddenly increased or decreased In the latter case the end face of the crystal grows preferentially at the centre until it reaches a proportionately smaller cross-sectional area. Both these effects have been observed. G. and D. then consider the effect of diffusion and the growing face on the variation of longitudinal growth rate with cross-sectional area in very fine filiform crystals. A dimensional treatment of the problem yields an expression which, with the appropriate numerical parameters, can be fitted to G. and Zhukova's results (ibid., p. 605:preceding abstract) on the growth of Ag in $AgNO_3$ soln. contg. traces of oleic acid or gelatin. Finally, G. and D. consider G. and Zhukova's observation (loc. cit.) that at high currents Ag crystals tend to become dendritic. This is explained by periodic impoverishment of the soln. in front of the growing end face, so that the crystal grows more easily on a side face. - G.B.H.







GORBUNOVA, K. M.

Gorbunova, K. M. The work of academician V. A. Kistiakovskii and its development. (On his 85th birthday.) Page 1170.

SO: Journal of Physical Chemistry, Vol. 74, No. 10. October 1950.

GORBUNOVA, K. M.

PA 190T21

USSR/Chemistry - Electrolytic Deposition Aug 51

"Structure of Bright Electrolytic Deposits and Mechanism of Their Formation. Electron-Microscopic and Electronographic Investigation of Bright Nickel and Zinc Coatings," K. M. Gorbunova, T. V. Ivanovskaya, N. A. Shishakov, Inst Phys Chem, Moscow, Acad Sci USSR

"Zhur Fiz Khim" Vol XXV, No 8, pp 981-987

Finds that bright cathodically deposited metal coatings form as result of electrolytic polishing which occurs when the metal surface is covered

LC 190T21

USSR/Chemistry - Electrolytic Deposition (Contd) Aug 51

with sufficiently thick film of hydroxide. Presence of film is also essential in anodic polishing in order that a bright surface may form.

LC 190T21

GORBUNOVA, K. M. MOSCOW

PA 194T20

USSR/Chemistry - Electrochemistry Oct 51

"Chronicle: Conference on Electrochemistry,"
K. M. Gorbunova, Moscow

"Zhur Fiz Khim" Vol XXV, No 10, pp 1262-1270

Third All-Union Conference on Electrochem, held Dec 1950 in Moscow by Dept of Chem Sci, Acad Sci USSR, was devoted to work under following 4 basic headings: (1) Mechanism of Electrode Processes in Electrolyte Solns; (2) Problems of Theory and Practice of Electrodeposition of Metals; (3) Problems of Chemical Sources of Electric Current; (4) Problems of Electrolysis in

194T20

USSR/Chemistry - Electrochemistry (Contd) Oct 51

Chemical Industry. Representatives of USSR scientific and industrial organizations took part in conference. Reviews principal speakers and their topics in this summary.

194T20

IVANOVSKAYA, T. V.; GORBUNOVA, K. M.

Crystallography

Method for determination of the relief of microcrystal faces with the aid of the interference of multireflected rays. Trudy Inst. fiz. khimii AN SSSR, No. 1, 1952.

9. Monthly List of Russian Accessions, Library of Congress, December 1954. Unclassified

1. GORBUNOVA, K. M.

2. USSR (600)

4. Chemists

7. Acad. Vladimir Aleksandrovich Kistiakovskii. Obituary, Zhur. fiz. khim. 26, no. 12, 1952.

9. **Monthly List of Russian Accessions**, Library of Congress, May 1953. Unclassified

GORBUNOVA, K. M.

Mar/Apr 53

USSR/Physics - Electronography, Nickel Deposits

"Electronographic Investigation of Electrolytic Deposits of Nickel," K.M. Gorbunova and N. A. Shishakov, Inst of Phys Chemistry, Acd Sci USSR

Iz Ak Nauk SSSR, Ser Fiz, Vol 17, No 2, pp 242-245

Continue previous studies (K.M. Gorbunova et al, Zhur Fiz Khim, 25,891 (1951) on structure and mechanism of lustrous electrolytic deposits. Attempt to explain formation of electrolytic deposits of Ni crystals by analysis of electronographic patterns. Received 17 Feb 53.

262T99

Gorbunova K.M.

GORBUNOVA, K.M.

Chemical Abst.
Vol. 48 No. 8
Apr. 25, 1954
Metallurgy and Metallography

5(3) Abst

Adherence of zinc coatings to iron base. K. M. Gorbunova and T. D. Dankova (Inst. Phys. Chem., Acad. Sci. U.S.S.R., Moscow). *Zhur. Fiz. Khim.* 27, 1920-30(1953). —The work (joule/sq. cm.) of peeling an electrodeposited coating, 0.003 cm. thick, of Zn from an Fe surface was 0.25 for polished Fe and for Fe passivated in HNO_3, 0.18 for air-dried Fe, 0.15 for Fe passivated in satd. $K_2Cr_2O_7$ or 30% H_2O_2, 0.11 for Fe passivated in satd. K_2CrO_4, 0.10 for Fe passivated in 4*N* NaOH, and 0.01 for the octahedron face of magnetite. These values included 3–10% for bending the sepd. Zn strip. The rupture always occurred in the Zn layer, normally to the basis planes (0001). The area of contact between Zn and the Fe surface was less for passive than for normal Fe. The work of rupturing the Zn coating was approx. 1000 times as great as the energy of the newly formed surface. Apparently, approx. 900 atoms are pulled away from their neighbors almost to the limiting distance before one atom moves beyond this distance and starts a crack.

J. J. Bikerman

GORBUNOVA, K. M.

USSR/Chemistry Reduction

Card 1/1

Authors : Gorbunova, K. M., and Nikiforova, A. A.

Title : Reduction of nickel with hypophosphite. Part 1. - State of formation and certain properties of coatings

Periodical : Zhur. Fiz. Khim., 28, Ed. 5, 883 - 896, May 1954

Abstract : The reaction conditions leading to the reduction of nickel in solutions containing hypophosphite, and the effect of individual factors such as temperature, pH, concentration of hypophosphite, nickel salts, etc. on the rate of nickel reduction were investigated. The reduction of nickel is followed by the oxidation of the hypophosphite and the formation of certain oxidation products. Coatings obtained by the chemical reduction process showed even and good cohesion with the basic metal, lower elasticity, increased wear resistance and highly protective properties. Nine references: 1-USSR, 1-USA Bur. of Standards, 5-German, 2-French. Tables, graphs, photos.

Institution : Acad. of Sc. USSR, Institute of Physical Chemistry, Moscow

Submitted : Sept. 30, 1953

GORBUNOVA, K. M.

USSR/Chemistry - Reduction

Card 1/1

Author : Gorbunova, K. M., and Nikiforova, A. A.

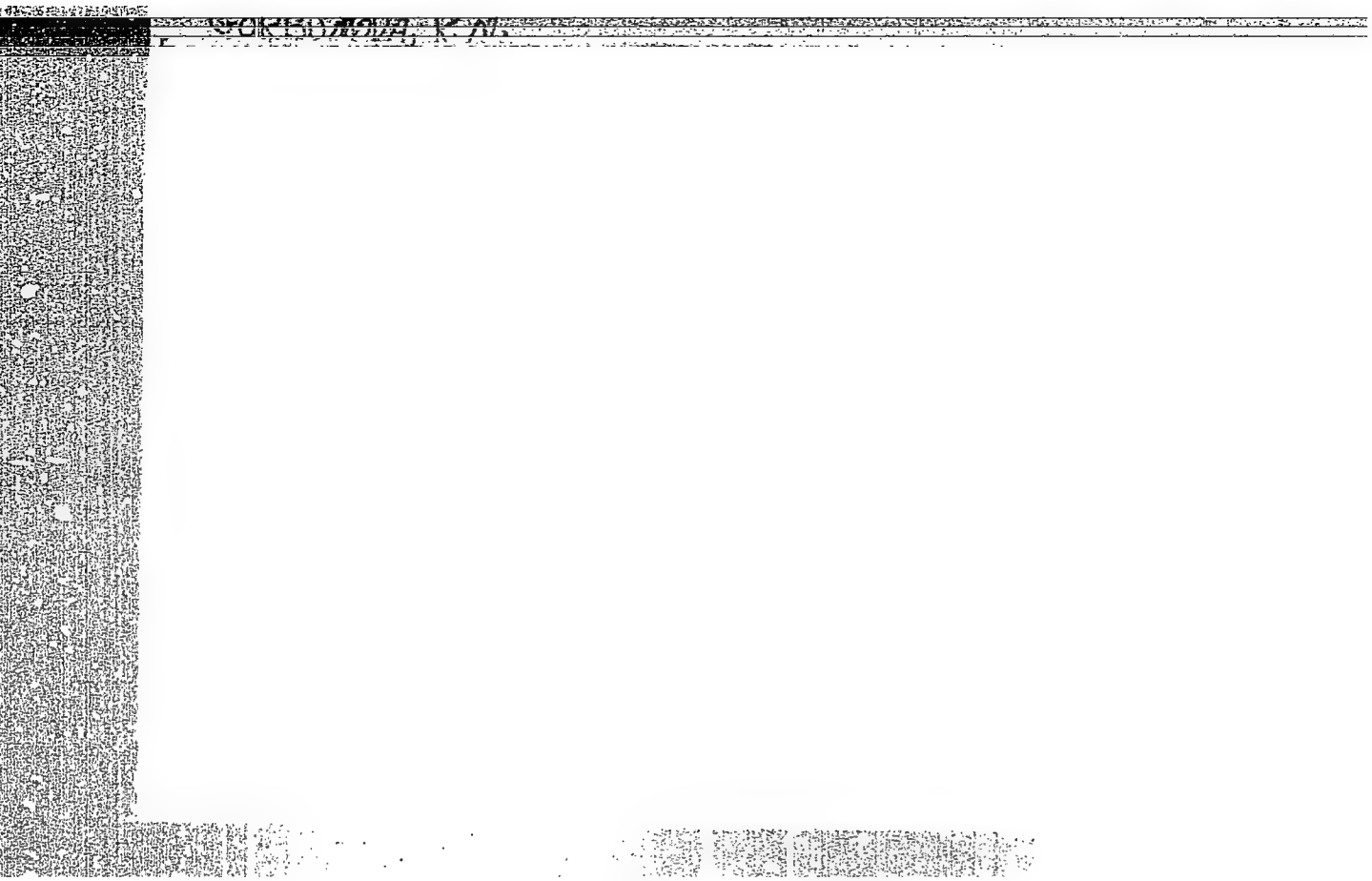
Title : Reduction of nickel with hypophosphite. Part 2. - Problems of the reaction mechanism

Periodical : Zhur. Fiz. Khim., 28, Ed. 5, 897 - 901, May 1954

Abstract : The first phase of the nickel reduction process consists, in catalytic decomposition, of the hypophosphite with water and the formation of hydroger The oxidation of the hypophosphite into hypophosphate and phosphate is considered a possibility. The second phase is the reaction of the active hydrogen with the nickel ion and the formation of metallic nickel. There is also an additional reaction, namely, the reaction between the hydrogen and the hypophosphite leading to the reduction of the phosphorus into an atom state. Six references: 2-USSR, 2- German, 2-USA. Table, graph.

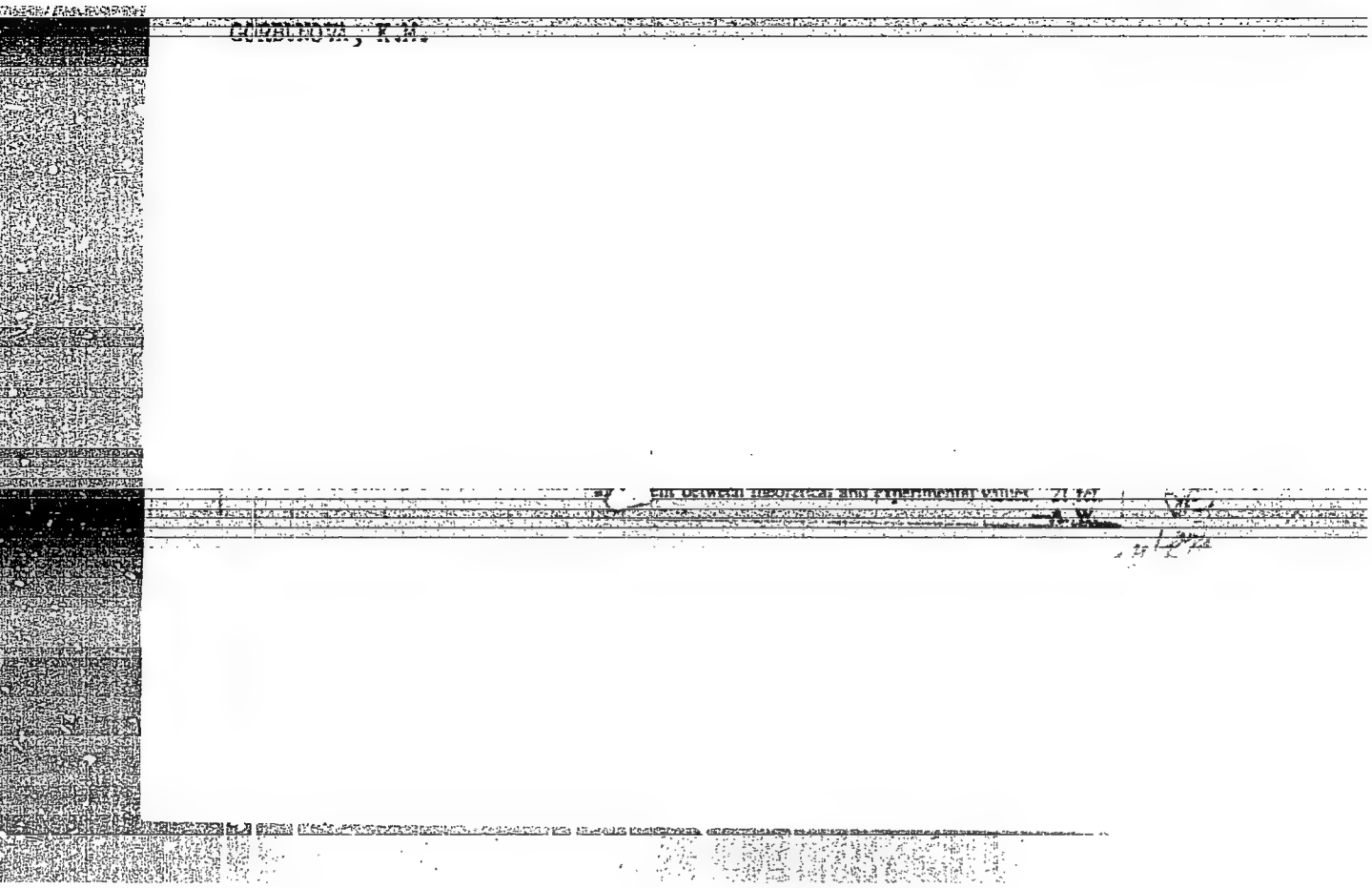
Institution : Acad. of Sc. USSR, Institute of Physical Chemistry, Moscow

Submitted : Sept. 30, 1953



GORBUNOVA, K. M. And ARSLAMBEKOV, V. A.

"Results of Research on the Kinetic of Oxydation of Molybdenum and Tungsten and on the Nature of the Oxydes That Appear", a report presented at the 6th Conference on Chemical Physics, Paris, 1956.



GORBUNOVA, K.M.

USSR/Physical Chemistry - Electrochemistry. B-12

Abs Jour : Referat Zhur - Khimiya, No 6, 25 March 1957, 18706

Author : Polukarov, Yu.M., and Gorbunova, K.M.
Inst : RZhKhim, 1956, 71289
Title : Some Problems of the Theory of Electroprecipitation of Alloys. II. Examination of the Displacement of Potentials of the Discharge of Ions When the Alloy is Being Formed.

Orig Pub : Zh. fiz. khimii, 1956, 30, No 4, 871-877

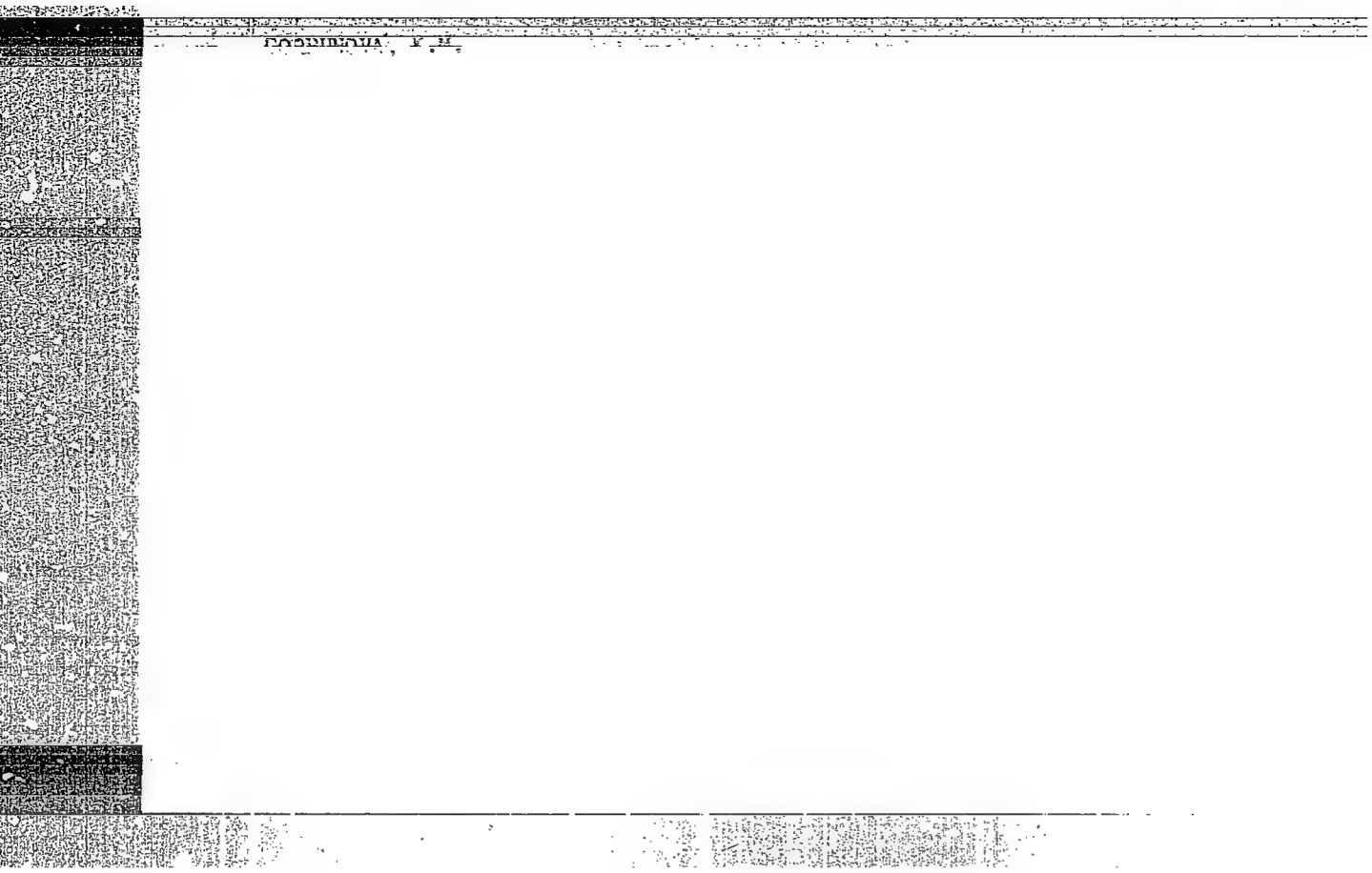
Abstract : The authors investigated the possibility of utilizing the values, computed from thermochemical data and referring to the displacement of a counterbalanced potential of an electronegative metal, for the energy of its interaction with another metal, in order to solve the question of potentials of ion discharge during the electroprecipitation of an alloy which precipitation is an unbalanced process. On the basis of electrochemical investigation in aqueous solutions and in molten electrolytes, it is

Card 1/2

Abs Jour : Referat Zhur - Khimiya, No 6, 25 March 1957, 18706

established that, in the case of the systems Cu-Zn, Mg-Bi, Mg-Cd and Mg-Al, we observe that a potential of the discharge of ions of metals are exalted when they enter into the alloy, and this exalting coincide with the value computed on the basis of data for the change of partial molal thermodynamic potentials. On the basis of thermocynamic computations it is shown that there is a possibility of co- precipitation of Al and Ni or Co from aqueous solutions when potentials of the cathode are sufficiently high. Precipitates of Ni and Co containing up to 5% Al were obtained from a bath consisting of $Al_2(SO_4)_3 \cdot 18H_2O$ (80 g/ℓ) + citric acid (200 g/ℓ) with content of Ni or Co up to 0.2 n.

Part I see RZhKhim, 1956, 71289.



LAYNER, V.I., professor, doktor; KUDRYAVTSEV, N.T., professor, doktor; GORBUNOVA, K.M., professor, doktor, retsenzent; DOKIN, N.I., inzhener, retsenzent; KHMIN, V.M., inzhener, retsenzent; CHERNOV, A.N., redaktor; KAMAYEVA, O.N., redaktor izdatel'stva; ATTOPOVICH, M.K., tekhnicheskiy redaktor.

[Principles of electroplating] Osnovy gal'vanostegii. Izd.3-e, perer.i dop. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii. Pt.2. 1957. 647 p. (MIRA 10:11)
(Electroplating)

S/564/57/000/000/003/029
D258/D307

AUTHORS: Gorbunova, K. M., Popova, O. S., Sutyagina, A. A., and Polukarov, Yu. M.

TITLE: Mechanism of growth and structure of metallic deposits formed during electrocrystallization

SOURCE: Rost kristallov; doklady na Pervom soveshchanii po rostu kristallov, 1956 g. Moscow, Izd-vo AN SSSR, 1957, 58-66

TEXT: The present article is a review of some of the authors' earlier studies and other work; attention is focused on some regularities concerning the cathode deposition of metals, as dense or porous, dendritic, coatings. An increase in the electrolysis current leads to an increase in the surface of the crystallizing metal, leading to an increase in the number of crystals or to dendritization, according to conditions. Powder [illegible] fine dendrites' occurs at the saturat[illegible]

Card [illegible]

S/564/57/000/000/003/029
D256/D307

Mechanism of growth...

Properties of such polydendritic and of dense galvanic coatings are indicated, and conditions leading to the formation of electrolytic deposits with a predetermined crystal orientation are discussed with particular reference to the earlier work of Gorbunova. It is believed that orientation may be ascribed to the unequal rates of growth of variously oriented crystals. Possible mechanisms for the formation of texture on coatings are indicated. An account is also given of the authors' earlier study of internal stresses in galvanic coatings, particularly in the presence of surface-active compounds, and of the conditions leading to coatings possessing [illegible] surfaces. There are [illegible] references, [illegible] Soviet-bloc and [illegible] non-Soviet-

Card 2/2

137-58-4-7842

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 211 (USSR)

AUTHORS: Gorbunova, K. M., Popova, O. S., Sutyagina, A. A., Polukarov, Yu. M.

TITLE: Mechanism of Growth and Structure of Precipitates of Metals Produced by Electrical Crystallization (Mekhanizm rosta i stroyeniye osadkov metalla, voznikayushchikh pri elektrokristallizatsii)

PERIODICAL: V sb.: Rost kristallov. Moscow, AN SSSR, 1957, pp 58-66

ABSTRACT: Certain principles of the growth on the cathode of an electrolytic cell of deposits (D) of metal in the form of dense coatings or loose dendritic structures are examined. K. M. Gorbunova shows that when single crystals are formed, an increase in current I results in the $I/\Sigma S$-K ratio remaining constant because of the increase in the surface of growth. This latter results in a transition from growth of the single crystal to the growth of multicrystalline D (a relatively high concentration of discharging ions occurs) or to a growth of dendritic D (a low concentration of discharging ions). Dense polycrystalline D grow when ΣS-S is attained at the cathode. Subsequently, further increase in I can occur only when there is

Card 1/3

Mechanism of Growth and Structure (cont.)

a drop in the concentration of ions at the cathode. At a given I, the ion concentration at the cathode may prove to be close to zero: the maximum diffusion current is attained (MDC). Powder D form upon electrocrystallization under MDC conditions. The particles of the powder D are extremely fine dendrites, the angles between the branches of which are determined by the crystallographic nature of the metal. For Zn powder, the angle is 60°. In dense crystalline D the anisotropy of properties such as the magnetic, the linear compressibility, resistivity, thermal expansion, resistance to corrosion, etc., are determined by texture (orientation of all the crystals of the D in a given crystallographic direction). The authors hold that in the case of D with crystals above a certain size and small internal stresses (IS), it is more accurate to regard texture as "growth texture." Texture comes into being as the result of competition between crystals of different orientations, as the ionic building blocks brought up to the growing crystals are put to use. The change in the texture axis with change in the conditions of electrolysis is explained by the change in the ratios of the growth rates in different directions. The unique adherence of the texture of Zn and Cd D to a 6th-order axis [0001] c on application of an alternating current, with the surfaces bounded not by apices but by the faces of the base, may be explained in terms of the concepts developed by Kaishev and Bliznakov. X-ray and magnetic studies have made it possible to determine

Mechanism of Growth and Structure (cont.)

that IS anisotropy exists in Ni deposits, and also that the IS of Ni is not directly related to the amount of occluded H_2. Introduction of brightening agents in the bath leads to the formation of deposits not having the definite, clearly defined boundaries characteristic of crystals, and the D consist of rounded forms.

1. Cathodes--Deposits--Structural analysis 2. Metals--Crystallization--Structural analysis

O. P.

Card 3/3

GORBUNOVA, K.M.; NIKIFOROVA, A.A.

Studying the mechanism of inclusion of phosphorus in nickel platings by means of the radioactive isotope P^{32} [with summary in English]. Zhur.fiz.khim.31 no.8:1687-1692 Ag '57. (MIRA 10:12)

1. AN SSSR, Institut fizicheskoy khimii, Moskva.
(Nickel plating) (Phosphorus--Isotopes)

GORBUNOVA, K. M.

76-10-16/34

AUTHORS: Polukarov, Yu.M., Gorbunova, K.M.

TITLE: Some Problems in the Theory of the Electrodeposition of Alloys. IV. Oscillographic Study of the Cathodic Potential in the Alloy Deposition Process. (Nekotoryye vopposy teorii elektroosazhdeniya splavov. IV. Ostsillograficheskoye issledovaniye potentsiala katoda v protsesse osazhdeniya splavov)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 10, pp. 2281-2287 (USSR)

ABSTRACT: It was the purpose of the task to explain the dependence of the character of the cathode potential variation on the phase structure of the forming alloy (continuous series of solid solutions, some solid solutions, formation of chemical compounds or eutectic mixture). The attention in the investigation was attracted by the solution of the question whether the ion discharge takes place simultaneously in both metals or subsequently and to which extent the type of the resulting deposition structure is connected withthe electrochemical characteristics of the process. It is shown that the ion discharge in the formation of silver-mercury and silver-cadmium alloys which occur at the ca-

Card 1/2

Some Problems in the Theory of the Electrodeposition of Alloys. IV. Oscillographic Study of the Cathodic Potential in the Alloy Deposition Process

thode potentials which exceed the potentials of the ion discharges of the metal electronegative to the greatest extent given in the solution, occurs simultaneously and not by means of a subsequent discharge process of the various ions. This detection agrees with the data of the radiographic analyses carried out by different authors. On the strength of the microscopic observation it is shown that the potential fluctuation found in some cases at the surface of the mercury is in the case of deposition of the silver-mercury alloy connected with the periodic dissolution of the α -phase of the alloy in mercury. There are 4 figures and 4 Slavic references.

ASSOCIATION: Institute for Physical Chemistry of the AN USSR (Akademiya nauk SSSR. Institut fizicheskoy khimii)

SUBMITTED: September 4, 1956

AVAILABLE: Library of Congress

GORBUNOVA, K. M.

AUTHORS: Polukarov, Yu.M., Gorbunova, K.M. 76-12-12/27

TITLE: Some Questions From the Theory on the Electro-Deposition of Alloys (Nekotoryye voprosy teorii elektroosazhdeniya splavov)
V. Oscillographic Investigation of the Cathode-Potential During the Deposition of the Alloy (Copper-Zinc, Copper-Lead, and Nickel-Cobalt Systems) (V. Ostsillograficheskoye issledovaniye potentsiala katoda v protsesse osazhdeniya splava (sistemy med'-tsink, med'-svinets i nickel' -kobal't).

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 12, pp.2682-2689 (USSR)

ABSTRACT: The following systems were investigated: Copper-zinc system (a system with some solid solutions and a considerable amount of mixture-energy), copper-lead system (system of eutectic type), and the nickel-cobalt system (continuous series of solid solutions). The method described in the previous work Ref. 1 was applied. The following was stated: 1.) Potential-changes with a great period of oscillation within which oscillations with a smaller period took place, were stated with the depositions of the copper-lead and nickel-cobalt alloys. 2.) It was stated that the great periods of cathode-potential-change (with the deposition of nickel-cobalt- and copper-lead

Card 1/3

alloys) recorded on the oscillograms, correspond to the time required for the formation of a layer in the deposition. 3.) In order to clarify the nature of the potential-oscillations during the Process of depositions of alloys, which is accompanied by a process of hydrogen separation, oscillograms for the process of hydrogen-ion-discharge on copper and zinc from a cyanogen solution were plotted. It was shown in this context that the cathode-potential with the discharge of hydrogen-ions changes periodically. 4.) It was stated that the potential oscillations with a small period at the deposition of alloys depend on the process of hydrogen-precipitation. 5.) No substantial difference was discovered in the character of the change of the cathode-potential during the process of ion-discharge with formation of alloys which belong to the various types of equilibrium diagrams. There are 5 figures, and 6 references, 5 of which are Slavic.

Some Questions From the Theory on the Electro-Deposition of Alloys. V. Oscillographic Investigation of the Cathode-Potential During the Deposition of the Alloy (Copper-Zinc, Copper-Lead, and Nickel-Cobalt Systems)

76-12-12/27

ASSOCIATION: AN USSR. Institute of Physical Chemistry, Moscow (Akademiya nauk SSSR. Institut fizicheskoy khimii, Moskva).

SUBMITTED: September 4, 1956

AVAILABLE: Library of Congress

Card 3/3

SOV/123-59-15-59861

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 15, p 136 (USSR)

AUTHORS: Nikiforova, A.A., Gorbunova, K.M.

TITLE: Methods of Intensifying the Process of Chemical Nickel Plating

PERIODICAL: Fil. Vses. in-ta nauchn. i tekhn. inform. M., 1958, 20 pages, illustrated, 6 rubles.

ABSTRACT: The book has not been reviewed.

Card 1/1

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 4, p 149 (USSR) SOV/137-59-4-8380

AUTHORS: Izvekov, V.I., Gorbunova, K.M.

TITLE: Investigations Into Iron Diffusion in Corundum, Magnetite and Rutile With the Use of a Fe^{59} Tracer

PERIODICAL: V sb.: Metallurgiya i Metallovedeniye, Moscow, AS USSR, 1958, pp 511-514

ABSTRACT: Tablets of 10 mm in diameter and ~ 5 mm thickness were used as samples. They were prepared by pressing oxide powders under 4,000 kg/cm^2 pressure and sintering at 1,000°C during 50 hours. Radioactive Fe^{59} was applied by the method of evaporation in a vacuum. Diffusion annealing at 770 - 1,200°C was carried out in a vacuum (10^{-2} - 10^{-3} mm Hg) and in the air. The coefficient of diffusion D was measured by two methods, i.e. removing of layers and absorption. Each distribution curve of activation N over thickness x of the sample in the $\lg N$-x^2 coordinates reveals two portions; the initial portion pertains to diffusion in the volume of an oxide grain;

Card 1/2

SOV/137-59-4-8380

Investigations Into Iron Diffusion in Corundum, Magnetite and Rutile With the Use of a Fe^{59} Tracer

the final portion pertains to diffusion along the grain boundaries (the grain size is $\sim 1 - 10\mu$). Averaged values of voluminar and boundary diffusion by the method of removing layers) are in a satisfactory agreement with results obtained by the absorption method.

I.L.

Card 2/2

SOV/126-7-5-14/25

AUTHORS: Izvekov, V. I. and Gorbunova, K. M.

TITLE: Investigation of Diffusion of Iron in Corundum and Rutile by Means of the Fe^{59} Indicator (Issledovaniye diffuzii zheleza v korunde i rutile s pomoshch'yu indikatora Fe^{59})

PERIODICAL: Fizika metallov i metallovedeniye, Vol 7, Nr 5, pp 713-721 (USSR) 1958

ABSTRACT: In this report a few data are quoted which are characteristic of the diffusion process of iron in α-Al_2O_3 (corundum) and TiO_2 (rutile) and were obtained by using radioactive iron Fe^{59}. The specimens were made from powders of Al_2O_3 and TiO_2. Foreign inclusions in the Al_2O_3 powder were 0.1% SiO_2, 0.05% Fe, 0.1% alkali metal salts, 0.2% SO_4 and 0.05% Cl; and in TiO_2 0.1% of substances which are not precipitated by ammonia, 0.01% Fe and 0.05% heavy metals of the H_2S group. The specimens were cylindrical, with a diameter of 10 mm and thickness of 3-5 mm and were press from powders. The pressure of the press used was 4000-5000 kg/cm^2. The original powder was moistened with water in order to ensure greater strength of the specimen. After pressing, th

Card 1/6

Investigation of Diffusion of Iron in Corundum and Rutile by Means of the Fe^{59} Indicator

specimens were dried at 100-200°C for 10 hours. The subsequent baking of the specimens was carried out at 1100°C (for TiO_2) and 1400°C (for Al_2O_3) for 50 hours in an atmosphere of air or in a vacuum of 10^{-2}-10^{-3} mm Hg. As a result of the baking of the TiO_2 specimens a noticeable sagging and bending of their end faces was noticeable. This does not occur when baking Al_2O_3 specimens. In order to obtain a flat surface the end faces of the specimens were ground with emery paper. To remove stresses which are introduced during the manufacture of the specimens the latter were submitted to a lengthy (20-25 hours) anneal (homogenization) at the highest temperatures at which diffusion experiments were subsequently carried out (above 1000°C). After these operations the specimens were ready for covering with a layer of iron containing the Fe^{59} indicator. The strength of the specimens used for experiments was determined by a weight method. For corundum it was an average of 2 g/cm^3 and for rutile 3,03-3.69 g/cm^3. The coating of

Investigation of Diffusion of Iron in Corundum and Rutile by Means of the Fe^{59} Indicator

specimens with a radioactive layer of the indicator was carried out in vacuum by means of evaporating iron and the Fe^{59} indicator, and subsequent condensation of the metal vapour on the specimens to be investigated. The coating of the specimen with a layer of marked iron atoms was carried out in a vacuum apparatus made of molybdenum glass (Fig.1). The diffusion annealing was carried out in quartz tubes in furnaces with an automatic temperature regulation. Rutile specimens were held in an air atmosphere at 800, 900 and 1000°C, and in the case of vacuum annealing (10^{-2}-10^{-3} mm Hg.) at 770, 850, 900, 950 and 1000°C. The diffusion in corundum was studied under heating conditions at 900, 1000 and 1100°C. The temperature was measured by Pt-PtRh and chromel-alumel thermocouples placed in the zone in which the specimens were situated inside the quartz tubes. For determination of the diffusion coefficients of iron in corundum and rutile two methods were used: (a) an absorption method, in which the diffusion constants D for each temperature were calculated from the decrease of activity in time, which is determined from the direction of the applied radioactive substance.

Investigation of Diffusion of Iron in Corundum and Rutile by Means of the Fe^{59} Indicator

(b) a method involving repeated removal, by mechanical grinding of layers after lengthy annealing. The activity of the specimen was determined after each grinding operation. On the basis of the results obtained an activity distribution curve along the depth of the specimen has been constructed which enables the diffusion coefficient to be calculated. Preliminary experiments with corundum specimens in an air atmosphere have shown that there is no fall in activity under absorption measurement conditions even after lengthy annealing (200 hours at 1000°C. The layer removal method has enabled activity distribution curves along the thickness of the specimens of corundum, soaked in vacuum at 900, 1000 and 1100°C, to be obtained within the coordinates (N - x), one of which is shown in Fig.3; and its form in the semi-logarithmic coordinates log N = $f(x^2)$ is shown in Fig.4. On the basis of these curves the diffusion coefficients of iron in α-Al_2O_3 have been determined and are shown in Table 1 (p 717). In Fig.5 the straight lines 1 and 2 reflect the

Investigation of Diffusion of Iron in Corundum and Rutile by Means of the Fe^{59} Indicator

diffusion process along the boundary surfaces and in the grain depth respectively. The results of experimental determinations of diffusion coefficients of iron in rutile on annealing in an air atmosphere are shown in Table 2 (p 718). In the absorption measurements rutile specimens were periodically removed from the furnace. The fall in activity for three rutile specimens at different temperatures in relation to the time of heating is shown in Fig.6. The activity distribution along the depth of the specimens was again determined by the layer removal method. From the results of Table 2 the relationship $\log D = f(1/T)$ has been constructed (Fig.7). The final values for the diffusion coefficients obtained in annealing rutile specimens in vacuum are shown in Table 3 (p 718). From the results of Table 3 the relationship $\log D = f(1/T)$ was constructed (Fig.8). The values of the activation energy Q and the pre-exponential multipliers D_o for rutile under various experimental conditions, calculated from experimental results, are shown in Table 4(p 720). There are 8 figures, 4 tables and 17 references, of which 5 are Soviet, 3 English, 8 Scandinavian and 1 German.

Card 5/6

Investigation of Diffusion of Iron in Corundum and Rutile by Means of the Fe^{59} Indicator SOV/126-- -7-5-14/25

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry, Academy of Sciences, USSR)

SUBMITTED: November 2, 1957

Card 6/6

AUTHORS: Polukarov, Yu. M., Gorbunova, K. M. 76-32-4-5/43

TITLE: Some Problems Concerning the Theory of Electro-Deposition of Alloys (Nekotoryye voprosy teorii elektrosazhdeniya splavov).
VI. The Mechanism of the Formation of Supersaturated Solid Solutions and of Two-Phase Systems During the Electrocrystallization of Alloys (VI. O mekhanizme obrazovaniya peresyshchennykh tverdykh rastvorov i dvukhfaznykh sistem pri elektrokristallizatsii splavov)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 4, pp. 762-768 (USSR)

ABSTRACT: After Jacobi (Reference 1) found the possibility of electric copper and zinc deposition the problem arose if the deposit was a mixture of the metallic crystals or an alloy. This problem was radiographically investigated; works by Nakamura (Reference 1), Kersten (Reference 2), Roux and Cournot (Reference 3), Stillwell and Stout (Reference 4), Umanskiy and Layner (Reference 6) Bechard (Reference 9), Raub and Krause (Reference 1o)

Card 1/4

and by Raub and Engel (References 13, 16) are known in this connection, and they are explained in the present paper. As the problem mentioned in the title has never been examined until now and on the other hand might be an important contribution to the prediction of alloying properties the authors investigated in this paper the formation and the growth of a new alloying phase on the cathode. The increase of the cathode potential with the connection to the current source was already observed by Volmer et al. (Reference 21), he also explained it and afterwards they made considerations in connection with the change of the cathode potential which are to make possible the determination of the deposition structure. For this purpose investigations of the function of the deposition structure of the alloy on the magnitude of the cathode potential were carried out. From the experimental part can be seen that three systems were used: copper-silver, copper-lead, and copper-nickel. It was observed

that in the case of electro-depositions which are located at cathode potentials in the near of the potential of equilibrium (with lead) the formation of supersaturated solid solutions (of lead in copper) are to be expected, while in the case of depositions of alloys with higher chemical polarization at high current densities the formation of two-phase systems can take place, also in systems which in equilibrium supply a continuous series of solid solutions. The deposition of the copper-nickel alloy is mentioned as example; here a solid solution separates at low current densities, while at high current densities the excess voltage is so great that an own formation of nickel phase takes place.
There are 3 figures, 1 table and 23 references, 7 of which are Soviet.

Some Problems Concerning the Theory of Electro-Deposition of Alloys. VI. The Mechanism of the Formation of Supersaturated Solid Solutions and of Two-Phase Systems During the Electrocrystallization of Alloys.

76-32-4-5/43

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva (Institute of Physical Chemistry, AS USSR, Moscow)

SUBMITTED: September 4, 1957

AVAILABLE: Library of Congress

1. Alloys--Electrodeposition 2. Electrodeposition--Theory

Card 4/4

AUTHORS: Gorbunova, K. M., Sutyagina, A. A. 76-32-4-9/43

TITLE: The Gloss of Electrolytic Deposits and its Connection With the Internal and External Structure of the Deposit (K voprosu o bleske elektroliticheskikh osadkov i svyazi yego s vnutrennim i vneshnim stroyeniyem osadka)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 4, pp. 785 - 790 (USSR)

ABSTRACT: By changing the conditions of deposition an essential change of the crystal lattices is caused in many metals; this is made reason for the present paper to deal with the problem of the influence of geometric factors or the surface relief respectively on the gloss. It is assumed that the gloss is determined by the size of the crystals forming the deposit, and that they only shine when the crystal dimensions are sufficiently small. Similar statements were made by Wittum (Reference 1) and S. M. Kochergin (Reference 3,2) as well as by A. T. Vagramyan and Z. A. Solov'yeva (Reference 4,5). Wood (Reference 6) was the first to point out the connection between the gloss and the crystal orientation, while S. P. Makar'yeva (Reference 7)

Card 1/3

The Gloss of Electrolytic Deposits and its Connection With the Internal and External Structure of the Deposit

observed changes of the texture, just as well as V. I. Arkharov (Reference 8), L. S. Palatnik (Reference 9), V. I. Arkharov (Reference 8), G. F. Kosolapov and B. Yu. Mett (Reference 10), N. T. Kudryavtsev and B. V. Ershler (Reference 11) investigated electrodeposits of zinc. In the last years the opinion became popular which originated from K. M. Gorbunova et al. (Reference 12,13) that gloss is not clearly determined by the dimension and the character of mutual orientation of the crystals. This was also noticed in a similar way by Smith, Keeler and Read (Reference 14) as well as by Read and Weil (Reference 15)and Klark and Simonsen (Reference 16). In the present work the new data obtained by A. A. Sutyagina (Reference 19) are investigated and the influence of a.c. on the electrocrystallization of a number of metals is dealt with. As can be seen from the results and the mentioned figures the crystal dimension is no clear criterion for the gloss; some examples are given for this. A connection between the texture

The Gloss of Electrolytic Deposits and its Connection With the Internal and External Structure of the Deposit

and the gloss was also not observed, and the assumptions by K. M. Gorbunova, T. V. Ivanovskaya and N. A. Shishakov (Reference 12) were proved. The electrochemical investigations of glossy and dead zinc depositions showed, however, that the increase of surface polish and the absence of sharp raisings increase the gloss so that a connection between the reflection coefficient and the surface relief is assumed. There are 8 figures, 1 table and 2o references, 13 of which are Soviet.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva (Moscow Physico-Chemical Institute, AS USSR)

SUBMITTED: November 26, 1956

AVAILABLE: Library of Congress

Card 3/3 1. Metals--Electrodeposition 2. Crystals--Lattices 3. Metals --Surface properties

AUTHORS: Popova, O. S., Gorbunova, K. M. SOV/76-32-9-12/46

TITLE: The Structure and Some Properties of Electrolytic Manganese (Stroyeniye i nekotoryye svoystva elektroliticheskogo margantsa

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 9, pp 2020 - 2028 (USSR)

ABSTRACT: The electrolytic solution used contained manganese sulfate and ammonium sulfate. An additional solution of the same composition but with glycerin added was also used. The manganese deposit was investigated using the microscope (Fig 1), the electron microscope (Fig 2), and X-ray apparatus. As the Debyograms show, the manganese deposits, and especially those from the solutions containing glycerin, are almost amorphic (Fig 6). After warming for a short time at about 120°C the manganese appears to have the structure of α-Mn or γ-Mn in the X-ray studies. Whichever modification appears is dependent upon the conditions of the electrolysis. The hydrogen content of the electrolytic deposit was also determined by using the apparatus shown in figure 3. The content was found to be between 5 and 8 cm^3

of hydrogen per gram of metal (Table). The greatest part of the hydrogen escapes up to 125°C, while the rest leaves up to 300°C (Figs 4 and 5). This behavior differs from that of electrolytic nickel (Fig 5). By using an elastic cathode the inner stress of the manganese was determined. According to the conditions of electrolysis this was found to be between 5 and 20 kg/mm^2. There are 6 figures, 1 table, and 30 references, 9 of which are Soviet.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva (AS USSR, Moscow, Institute of Physical Chemistry)

SUBMITTED: April 4, 1957

AUTHORS: Arslambekov, V. A., Gorbunova, K. M. 2o-119-2-29/6o

TITLE: The Kinetics of the Processes of Formation of Oxide Films on Tungsten and Molybdenum (K kinetike obrazovaniya okisnykh plenok na vol'frame i molibdene)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol 119, Nr 2, pp. 294 - 297 (USSR)

ABSTRACT: The results obtained are also of interest for the interpretation of the data of the kinetics of the oxidation of arbitrary metals. The apparatus used here made possible continuous observations of the growth of the oxide films within a wide interval of the oxygen pressures and within a wide temperature range by means of the weight method. Especially constructed vacuum micro-balances were used. The results of the measurement of weight were also recorded by means of an electronic circuit and by an automatically registering galvanometer. The sample suspended by a platinum wire was heated in a tubular furnace. With rising temperature the amount of the oxygen reacting with tungsten and molybdenum increases considerably and in this the velocity of the growth of the

Card 1/4

The Kinetics of the Processes of Formation of Oxide Films on Tungsten and Molybdenum

oxide film increases noticeably. At temperatures of above 300°C the growth of the oxide films on tungsten and molybdenum is described sufficiently by an equation of the parabolic type:

$$x^2 = kt + C.$$

The value of the constant k of the oxidation velocity of oxide films of considerable thickness depends only little on the amount of the original (specific) surface. With polished samples C was almost equal to zero and with reduced samples the value C was almost equal to that amount of oxygen which was necessary for the preceeding laying-on of the oxide film. A diagram shows the temperature dependence of the constants of oxidation of tungsten and molybdenum in the case of different kinds of surface pretreatment. The values of the activation energy are compiled in a table. The difference of the activation energies of electrolytically polished and ground tungsten samples is probably caused by the fact that the surface layer becomes deformed to a great extent

The Kinetics of the Processes of Formation of Oxide Films on Tungsten and Molybdenum

in grinding, and that remanent stresses occur. But in the samples electrolytically polished afterwards the surface under stress is removed. At temperatures of below 360°C the course of the curve lg k - 1/T changes with tungsten and molybdenum. Within this temperature range the process takes place only with half the activation energy as at higher energies. The constants of the reaction velocity to a great extent depend on the thickness of the oxide film; it shows its greatest value in the case of small film thickness and decreases by several orders of magnitude with growing thickness of film. Such a dependence can obviously be explained by the fact that the increase of the null scale (okalina) is determined by the diffusion of the component through the oxide film.

There are 4 figures, 1 table and 1 reference.

2o-119-2-29/6o

The Kinetics of the Processes of Formation of Oxide Films on Tungsten and Molybdenum

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute for Physical Chemistry, AS USSR)

PRESENTED: October 4,1957, by P. A. Rebinder, Member, Academy of Sciences, USSR

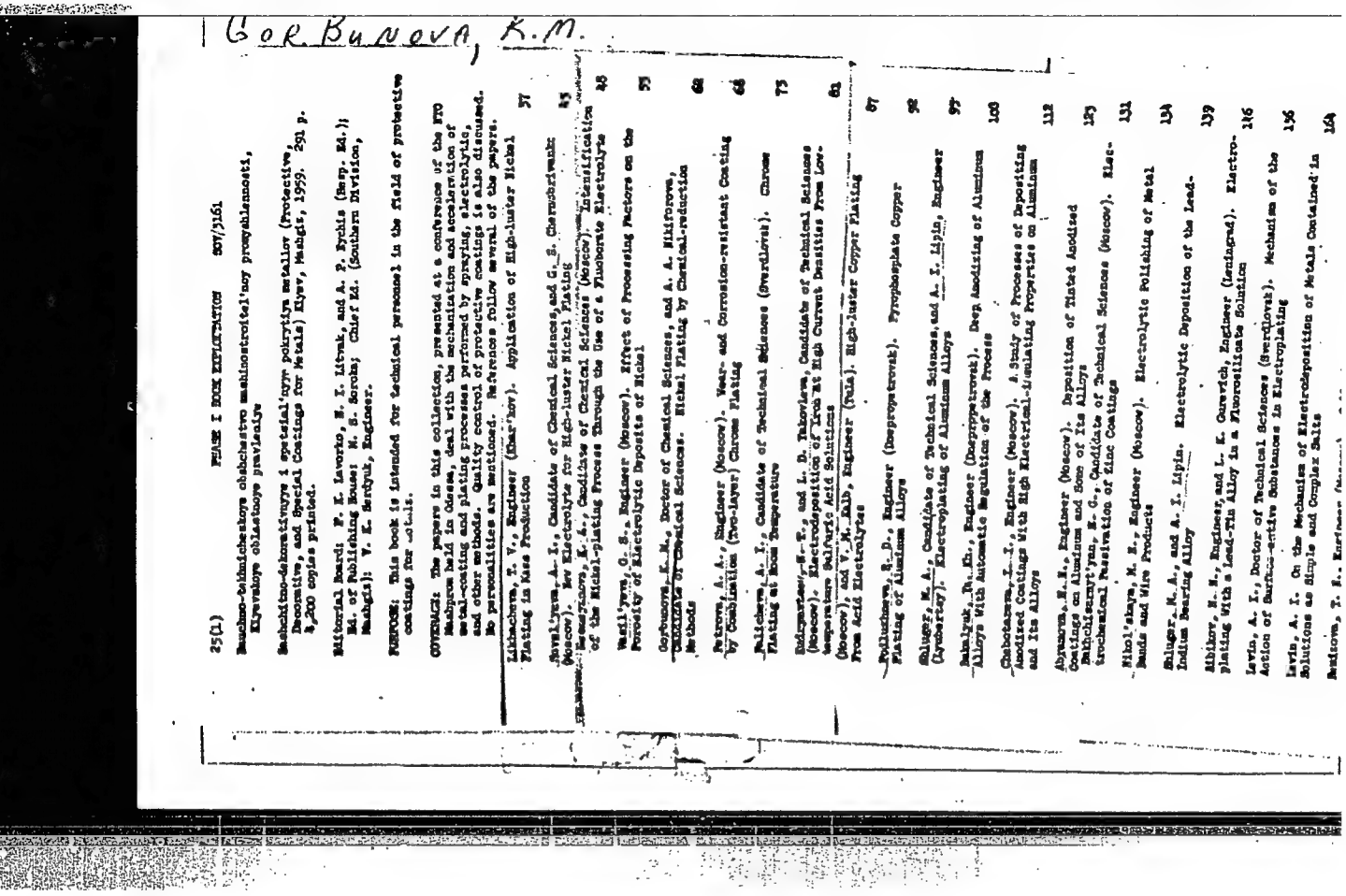
SUBMITTED: Library of Congress

Card 4/4

GORBUNOVA, K. M.

"Electrocrystallization from a crystallographic point of view,"

report to be submitted for the Intl. Committee of Thermodynamics (Electrochemical) and Kinetics, 11th Annual Meeting, Vienna, Austria, 29-Sep - 2 Oct 59.



Gor. Bunova, K.M.

PHASE I BOOK EXPLOITATION SOV/5161

25(1)

Bunova-Zakhicheskaya obshchestvo mashinostroitel'noy promyshlennosti, Klyuchnaya obshchestvo pravleniya

Zashchitno-dekorativnyye i spetsial'nyye pokrytiya metallov (Protective, Decorative, and Special Coatings for Metals) Kiyev, Mashgiz, 1959. 291 p. 3,200 copies printed.

Editorial Board: F. K. Lavorko, M. I. Litvak, and A. P. Rybin (Resp. Ed.); Ed. of Publishing House: M. S. Soroka; Chief Ed. (Southern Division, Mashgiz): V. K. Serdyuk, Engineer.

PURPOSE: This book is intended for technical personnel in the field of protective coating for metals.

COVERAGE: The papers in this collection, presented at a conference of the ZTO Mashgorm held in Odessa, deal with the mechanization and acceleration of metal-coating and plating processes performed by spraying, electrolytic, and other methods. Quality control of protective coatings is also discussed. No personalities are mentioned. References follow several of the papers.

82577

S/081/60/000/006/001/008
A006/A001

18.7400

Translation from: Referativnyy zhurnal, Khimiya, 1960, No. 6, p. 103, # 21631

AUTHORS: Sutyagina, A.A., Gorbunova, K.M.

TITLE: Some Regularities of Metal Electrocrystallization Under the Effect of A.C.

PERIODICAL: Tr. 4-go Sovneshchaniya po elektrokhimii, 1956, Moscow, AN SSSR, 1959, pp. 414-420

TEXT: The authors studied the effect of applying a.c. on the structure of electrolytic deposits of Ni, Cd and Zn obtained from electrolytes with addition of surface-active substances. The electron-microscopic method is used to show the coarsening of Ni, Cd and Zn crystals in electrolysis with a.c. application whose amplitude is greater than that of d.c. In the case of Zn there are also changes in the shape, dimension and the relative arrangement of the crystals; these changes are different in solutions with different additions. A higher frequency of a.c. reduces its effect until it disappears completely. It is assumed that the coarsening of the crystals is not connected with the desorption of the additions during the anode cycle. The authors

Card 1/2

82577

S/081/60/000/006/001/008
A006/A001

Some Regularities of Metal Electrocrystallization Under the Effect of A.C.

believe that in the case of Zn and Cd, the structural changes are connected with the surface activation of the anode current component as a result of the potential shift toward the anode zone; in the case of Ni, changes in the structure do not depend on the nature of surface-active additions and are caused by the difficult formation of Ni hydroxide in the layer near the electrode, due to H ionization and the accumulation of H+ ions during the anode pulses.

Z. Solov'yeva

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

5(4), 18(7)

AUTHORS: Gorbunova, K. M., Lebedeva, K. P.

SOV/76-33-3-26/41

TITLE: The Effect of Surface-active Substances on the Crystal Shape and Texture of Zinc Deposits (Vliyaniye poverkhnostno-aktivnykh veshchestv na formu kristallov i teksturu osadkov tsinka)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 3, pp 669 - 676 (USSR)

ABSTRACT: By a comparison of the polarization curves obtained on several crystal surfaces during electrolysis the rate of growth and variation of the shape of these crystals is determined. Many investigations have already been made with regard to this problem (Refs 10 - 19). In this connection it was also possible to observe the effect exercised by surface-active substances on the growth of crystals such as during the crystallization of silver from $AgNO_3$ solutions with the addition of acetic acid and phenyl acetic acid. For the purpose of studying a similar effect the authors investigated zinc crystals as hexagonal crystals are assumed to possess anisotropic properties. Zn monocrystals were

obtained in glass tubes by Bridzhmen's method and the basal surface and prismatic surfaces were exposed by shearing the sample at the temperature of liquid nitrogen. Zn was deposited from concentrated zinc sulphate solutions (4.7 n) at a pH value of 2.8-3. The results of measurement of solutions without surface-active substances indicate (Fig 1) that the polarization of Zn separation on the basal surface ($10\bar{1}0$) of the crystal is smaller by 20-25 mv than on the prismatic surface (0001); further, it was shown that the latter grows faster by three times than the former. Additions of the surface-active substances tetrabutyl ammonium iodide (I) and n-ootyl alcohol (II) did not affect the polarization of the Zn deposit on the surface ($10\bar{1}0$) up to quantities of 5.10^{-4} moles/l (I) and 2.10^{-2} moles/l (II), but accelerated the Zn deposition of Zn on the surface (0001) already at a quantity of 5.10^{-6} moles/l(I) so that with a certain concentration of (I) the surface (0001) can grow as fast as the surface ($10\bar{1}0$). This difference between the effect of (I) and (II) on the surfaces (0001) and ($10\bar{1}0$) is explained

by a more intense adsorption of (I) and (II) on the surface (0001). Unlike deposits without surface-active substances, those obtained from solutions with additions of (I) and (II) possess a texture. The effect of surface-active substances is assumed to be determined by two-dimensional centers of crystallization. There are 6 figures and 23 references, 9 of which are Soviet.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii (Academy of Sciences, USSR, Institute of Physical Chemistry)

SUBMITTED: August 12, 1957

5(4), 18(7) SOV/76-33-9-15/37

AUTHORS: Sutyagina, A. A., Gorbunova, K. M.

TITLE: Electrocrystallization of Nickel by the Application of Alternating Current. I. Structure of Deposits From Electrolytes Not Containing Additions of Surface Active Substances

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 9, pp 1982-1987 (USSR)

ABSTRACT: By considering the factors acting upon the electrolytic separation of metals, important structural changes may be assumed to take place in the metal deposit by the simultaneous application of direct and alternating current (of different amplitude and frequency). The authors investigated the effect of various current conditions on the size, shape, and texture of crystals in the metal deposit. An electrolyte (I) (160 g/l $NiSO_4 \cdot 7H_2O$, 10 g/l NaCl, 30 g/l H_3BO_3) was used, and the pH was changed from 1.9 up to 6. Deposition occurred at room temperature; the density of the direct current was changed from 1 to 3 a/dm^2, and that of the alternating current from 1 to 12 a/dm^2. Nickel deposits obtained with a pulsating current electrolysis (density of d.c. = 2 a/dm^2, density of a.c. =

Card 1/3

Electrocrystallization of Nickel by the Application of Alternating Current. I. Structure of Deposits From Electrolytes Not Containing Additions of Surface Active Substances

= 2 a/dm^2, frequency 50 cycles) differ but very little from those obtained with the direct current. With an increase in density of a.c. to 7.5 a/dm^2, however, the nickel deposit crystals grow to a great extent, and so does the change in texture (Figs 1-7), while reflection is diminished. In alternating current frequencies of 500 cycles the last mentioned changes are not observable. A strong change of the nickel deposit occurs only with the ratio: density of a.c./density of d.c. >1 and with lower frequencies of the alternating current, in which connection the acidity of the electrolyte plays an important part. Similar observations were made with the electrolyte 160 g/l $NiSO_4 \cdot 7H_2O$, 45 g/l $NiCl_2 \cdot 6H_2O$, 30 g/l H_3BO_3. Investigations were extended to the change in potential of nickel separation under the abovementioned conditions with the aid of a special apparatus (Fig 8), and a loop oscillograph. By the application of alternating current (50 cycles) the cathode potential changes according to a sinusoid, the axis of which shifts to more positive values (Table), as compared to the potential of nickel separation in the application of a direct

Electrocrystallization of Nickel by the Application of Alternating Current. I. Structure of Deposits From Electrolytes Not Containing Additions of Surfac Active Substances

current only. (Fig 9, oscillograms). There are 9 figures, 1 table, and 10 references, 7 of which are Soviet.

SUBMITTED: February 22, 1956

Card 3/3

05804
SOV/76-33-10-2/45

5(4), 18(7)
AUTHORS: Sutyagina, A. A., Gorbunova, K. M.

TITLE: Electrocrystallization of Nickel Under Alternating Current Conditions. II. Electrolytes With Additions of Surface-active Substances

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 10, pp 2128-2134 (USSR)

ABSTRACT: In continuation of a previous paper the effect exerted by surface-active substances on the electrocrystallization of nickel is investigated. The method already described (Refs 1-4 is employed. The alternating current electrodeposition of nickel was investigated in the presence of one of the following substances: glass-producing additions of the anionic type of 2,6 - 2,7-naphthalene disulfonic acid; additions the effec of which is based on the separation of sulfur ions in the solu (thiourea, allylthiourea); additions of the molecular type (formaldehyde); additions of the cationic type (aniline). Nickel deposits which were obtained at direct current (D_G = 2 a/dm^2) from electrolytes with one of the above-menti ed substances have a lustrous surface on which no crystal f

Card 1/3

05804
SOV/76-33-10-2/45

Electrocrystallization of Nickel Under Alternating Current Conditions. II. Electrolytes With Additions of Surface-active Substances

were observed, not even with an EM-3 electron microscope (Fig 1). The radiographs of these deposits have blurred lines (Fig 2). The calculations of the radiographs carried out according to A. A. Sutyagina's method (Ref 4) showed that in the lustrous nickel deposits an X-ray diffraction pattern existed along the (001) axis. In accordance with data by K. M. Gorbunova, T. V. Ivanovskaya and N. A. Shishakov (Ref 5), an image with diffusion circles was obtained on electronograms (Fig 3) of nickel deposits resulting from solutions with an addition of 2,6 - 2,7-naphthalene disulfonic acid. At a ratio of $D_{a-c} : D_{d-c} > 1$ (alternating current of 50 cycles) a strong effect on the structure of the nickel deposit was observed; irrespective of the type of additions, in most cases nickel deposits were obtained with an X-ray diffraction pattern along the (001) axis. Nickel deposits obtained at direct current (D_G = 2 a/dm^2) from electrolytes with additions of formaldehyde or aniline possessed weak reflexion (Table), whereas nickel deposits from electrolytes with allylthiourea obtained at D_G = 1 - 2 a/dm^2 reflect strongly (Table). An increase of the

Card 2/3

05804

SOV/76-33-10-2/45

Electrocrystallization of Nickel Under Alternating Current Conditions. II. Electrolytes With Additions of Surface-active Substances

alternating-current frequency reduces its effect so that at frequencies of 5,000 cycles the nickel deposits show the same structure as those obtained at direct current only. The experimental results are explained and the papers by A. A. Rotinyan, V. Ya. Zel'des (Ref 10), I. I. Zhukov, Z. D. Pigareva (Ref 11), N. A. Izgaryshev, S. Berkman (Ref 16) and Yu. M. Polukarov (Ref 17) are mentioned; a change of the adsorption conditions on the cathode is taken into consideration (at a potential shift) as well as a change of the H^+-ionic concentration on the cathode (caused by a periodic change of the cathodic and anodic process). There are 8 figures, 1 table, and 17 references, 14 of which are Soviet.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii (Academy of Sciences of the USSR, Institute of Physical Chemistry)

SUBMITTED: February 22, 1958

Card 3/3

PHASE I BOOK EXPLOITATION SOV/3951

Gorbunova, Kseniya Mikhaylovna, and Anna Aleksandrovna Nikiforova

Fiziko-khimicheskiye osnovy protsessa khimicheskogo nikelirovaniya (Physico-chemical Bases of the Process of Chemical Nickel Plating) Moscow, Izd-vo AN SSSR, 1960. 206 p. Errata slip inserted. 3,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut fizicheskoy khimii. Ed. of Publishing House: N.G. Yegorov; Tech. Ed.: S.T. Shikin.

PURPOSE: This book is intended for skilled workers, laboratory technicians, and mechanics of electroplating and electroforming shops.

COVERAGE: The book deals with a chemical nickel-plating process which reduces nickel salts by hypophosphite. It reviews the general results of investigations of plating conditions, reaction mechanisms, properties of nickel coatings, and the results of research done by the authors at the Institute for Physical Chemistry of the Academy of Sciences USSR and other researchers, both Soviet and non-Soviet. The reaction kinetics of that stage of the plating process when nickel ions react with intermediated agents satisfying

Card 1/6

conditions for a first order reaction are also reviewed. The authors state that activation energy and activation entropy for the process are calculated for the first time in this book. They thank P.P. Belyayev and M.I. Zil'berfarb for useful observations and reviewers K.V. Chmutov and A.T. Vagramyan, and A.A. Sutyagina for editorial assistance. There are 56 figures, 60 tables, and 90 references: 35 Soviet, 21 English, 1 French, 1 Polish, and 32 German.

TABLE OF CONTENTS:

S/081/62/000/008/032/057
B156/B101

AUTHORS: Gorbunova, K. M., Polukarov, Yu. M.

TITLE: Electrocrystallization of alloys

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 8, 1962, 370, abstract 8K180 (Sb. "Elektrolit. osazhdeniye splavov", M., Mashgiz, 1961, 31-56)

TEXT: The conditions under which electrolytic alloys of various phase structures are formed at the cathode are examined. The results of research carried out with the binary Cu-Bi, Cu-Pb, Cu-Tl, Cu-Sn, and Cu-Cd alloys obtained from perchloric acid electrolytes are given. Methods of investigating alloys obtained by electrodeposition are described. 39 references. [Abstracter's note: Complete translation.]

Card 1/1

SUTYAGINA, A.A.; GORBUNOVA, K.M. (Moskva)

Electrocrystallization of some metals in the presence of the additions of sulfur-containing surface active agents. Part 1: Effect of the electrolysis conditions on the amount of impurities in zinc deposits, and the mechanism of their incorporation. Zhur.fiz.khim. 35 no.8:1769-1773 Ag '61. (MIRA 14:8)

1. Institut fizicheskoy khimii AN SSSR.
(Zinc--Plating)
(Sulfur organic compounds)

5.1310 1087 1521

29985
S/076/61/035/011/006/013
B110/B147

AUTHORS: Sutyagina, A. A., and Gorbunova, K. M. (Moscow)

TITLE: Study of the electrocrystallization process of some metals in the presence of sulfur-containing surface-active admixtures. II. Effect of the conditions of electrolysis on the amounts of impurities in nickel deposits and the properties determined by the above conditions

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 11, 1961, 2514-2523

TEXT: The dependence of the composition of Ni deposits on the type and concentration of admixtures, the acidity of the solution, and the current density at the cathode were studied to elucidate the nature of electrodic processes leading to the formation of indistinctly crystalline deposits. A solution of 160 g/liter of $NiSO_4 \cdot 7H_2O$, 30 g/liter of H_3BO_3, and 10 g/liter of NaCl with different pH values was used as electrolyte. Thiourea, allyl thiourea, β-sulfonaphthalic acid, 2,6- 2,7-disulfonaphthalic acid, α-naphthol disulfonic acid, α-naphthol sulfonic acid, sodium thiosulfate, thiosalicylic acid, diphenyl thiourea, and potassium thiocyanate were used as admixtures. The amount of occluded sulfur increases with increasing

Card 1/4

Study of the electrocrystallization ...

concentration of the admixture in acid electrolytes yielding larger amounts of occluded sulfur. The sulfur content is decreased by an increase of current density. The sulfur content is less when admixtures containing sulfur on a benzene ring or bound to oxygen are used. Since the overall-sulfur-to-carbon ratio is higher than in the organic admixtures, chemical conversions are assumed to take place in the deposit. Irrespective of the structure of the admixture, $\geq$90% of S is bound to Ni as sulfide. The higher carbon content probably caused by adsorption of the conversion products of the initial admixture is explained as being due to the removal of S from organic compounds by freshly deposited, H_2-saturated Ni (similar to Raney nickel). A temperature increase leads to an increase of the S content, despite of the desorption of surface-active agents. S-Ni ratio in the deposit was several times found to be equal to 2.5. The constant ratio found after extraction with CCl_4 and acetone indicates a loose chemical bond since the S-Ni ratio falls to 0.5-0.7 on heating to 130°C. X-ray analysis revealed a structural change at 400-450°C: After a reaction time of 1.5 hrs in the solid state, Ni and Ni_3S_2 were formed from the nickel and the high-sulfur primary sulfide phases under exothermic conditions (as has been thermographically established). Heat absorption at 600°C is due to

Card 2/4

Study of the electrocrystallization ...

the melting of a eutectic mixture consisting of Ni and the decomposition products of Ni_3S_2. The melting point of Ni is lowered by the occlusion of sulfur. The reflection coefficient of Ni deposits obtained from low-acidity electrolytes is lowered. Gloss is, however, not directly dependent on the sulfur content. The reflection coefficient is also raised when the current density is increased. The hardness of an Ni deposit obtained at 1.4 a/dm^2 (pH = 5.5), which was measured with a PMT-3 (PMT-3) device was about 210 kg/mm^2, that of an Ni deposit containing 0.69% S, prepared with 0.1 g/liter of thiourea (TU), was about 570 kg/mm^2. With increasing current density (2.6 a/dm^2), hardness at 0.1 g/liter of TU and at a sulfur content of about 0.42% decreases to 456 kg/mm^2, while it is increased in the absence of admixture (about 310 kg/mm^2 at 3.3 a/dm^2). At a sulfur content of about 5%, a change in the lattice constant of Ni by about 0.04% occur. Deposits from electrolytes with pH values of 2.5 to 2.6 and low current densities as well as from electrolytes with pH values of 5.5 and with TU additions of 0.3 to 0.5 g/liter showed no texture. Deposits obtained at high current densities from electrolytes with a pH value of about 5.5 and containing 0.1 to 0.2 g/liter of TU as well as from higher-acidity electrolytes showed textures oriented parallel to [001]. In the

Study of the electrocrystallization ...

absence of TU, the texture was oriented parallel to [110] at pH = 5.5. With deposits of the indistinctly crystalline "somatoidic" type, some of the reduced-metal atoms interact with the admixture molecules in the crystallization zone, forming particles interfering with the formation of the crystal lattice. The authors thank Z. V. Semenova for calculating X-ray pictures. Papers of A. V. Pamfilov, O. E. Panchuk, and R. M. Morgart are mentioned. There are 2 figures, 6 tables, and 11 references: 7 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: T. Rosenqvist, J. Iron and Steel Inst., 39, 1954; O. B. J. Fraser, Trans. Electrochem. Soc., 71, 425, 1937; H. Kersten a. W. T. Young, J. Appl. Phys., 8, 2, 133, 1938; V. Kohlschütter, Trans. Faraday Soc., 31, 1181, 1935.

ASSOCIATION: Akademiya nauk SSSR Institut fizicheskoy khimii (Academy of Sciences USSR, Institute of Physical Chemistry)

SUBMITTED: March 31, 1960

Card 4/4

S/076/62/036/009/001/011
B101/B102

AUTHORS: Polukarov, Yu. M., Gorbunova, K. M., and Bondar', V. V. (Moscow)

TITLE: Some problems of the alloy electrodeposition theory. VIII. Study of the dependence of copper alloy phase structure on the electrochemical conditions of deposition

PERIODICAL: Zhurnal fizicheskoy khimii , v. 36, no. 9, 1962, 1870 - 1876

TEXT: The electrodeposition of supersaturated solid solutions of lead, thallium, tin, or cadmium in copper from solutions of perchlorates (Pb-Cu, Sn-Cu, Cd-Cu) or of sulfates (Sn-Cu), or nitrates (Tl - Cu) was investigated. In all cases, the deposition of Pb, Tl, Sn, and Cd started at more positive potentials than would correspond to the equilibrium potential of these metals, and the lattice constant of the copper was greatly expanded. The solid Sn-Cu solution contained more than 22% Sn, the lattice constant was 3.75 Å, and at a cathode potential more positive than -130 mv the $Cu_{31}Sn_8$ phase (high-temperature δ-phase) was formed. The solid Cd-Cu

Card 1/2

Some problems of the alloy ...

solution contained ~16% Cd, the maximum lattice constant was 3.716 Å at -0.350 v. The supersaturation observed is explained as follows: Owing to high overvoltage, a highly active Cu lattice is formed in which the electronegative metals have higher solubility, so that the separation potential becomes more positive. The lattice then loses its excess energy, and a supersaturated solid solution is formed. The supersaturation depends on the cathode overvoltage attaining 150 - 300 mv with Tl, and on the rate of electrodeposition. There are 4 figures.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii (Academy of Sciences USSR, Institute of Physical Chemistry)

SUBMITTED: September 27, 1960

Card 2/2

POLUKAROV, Yu.M.; GORBUNOVA, K.M.; BONDAR', V.V.

Some problems in the theory of the electrodeposition of alloys. Part 7: Investigation of the phase structure of copper-bismuth alloys in relation to the electrochemical conditions of their production. Zhur.fiz.khim. 36 no.8:1661-1666 Ag '62. (MIRA 15:8)

1. Institut fizicheskoy khimii AN SSSR.
(Bismuth-copper alloys) (Electrochemistry)

POLUKAROV, Yu.M.; GORBUNOVA, K.M.; BONDAR', V.V.

Certain aspects of the theory of electrodeposition of alloys. Part 8. Zhur. fiz. khim. 36 no.9:1870-1876 S '62. (MIRA 17:6)

1. Institut fizicheskoy khimii AN SSSR.

SUTYAGINA, A.A.; GORBUNOVA, K.M.; GLAZUNOV, M.P.

Mechanism of chemical nickel plating reaction. Dokl. AN SSSR 147 no.5:1133-1136 D '62. (MIRA 16:2)

1. Institut fizicheskoy khimii AN SSSR. Predstavleno akademikom V.I. Spitsynym.

(Nickel plating) (Reduction, Chemical)

BAYMAKOV, Yuriy Vladimirovich; ZHURIN, Aleksandr Ivanovich; LEVIN, A.I., prof., doktor tekhn. nauk, retsenzent; SMIRNOV, V.I., prof., retsenzent; STENDER, V.V., prof., retsenzent; GORBUNOVA, K.M., prof., doktor khim. nauk, red.; PAKHOMOVA, G.N., kand. tekhn. nauk, red.; MARENKOV, Ye.A., red.; MISHARINA, K.D., red.izd-va; MIKHAYLOVA, V.V., tekhn. red.

[Electrolysis in hydrometallurgy]Elektroliz v gidrometallurgii. Moskva, Metallurgizdat, 1963. 616 p. (MIRA 16:2)

1. Kafedra tekhnologii elektrokhimicheskikh proizvodstv Ural'skogo politekhnicheskogo instituta (for Levin). 2. Kafedra metallurgii tsvetnykh metallov Ural'skogo politekhnicheskogo instituta, Deystvitel'nyy chlen Akademii nauk Kazakhskoy SSR (for Smirnov). 3. Chlen-korrespondent Akademii nauk Kazakhskoy SSR (for Stender).
(Hydrometallurgy) (Electrometallurgy)

SUTYAGINA, A.A.; GORBUNOVA, K.M.; GLAZUNOV, M.P.

Reaction mechanism of nickel reduction by hypophosphite studied with the aid of deuterium as tracer. Part 1: Solutions without organic additives. Zhur. fiz. khim. 37 no.9:2022-2026 S '63. (MIRA 16:12)

1. Institut fizicheskoy khimii AN SSSR.

SUTYAGINA, A.A.; GORBUNOVA, K.M.; GLAZUNOV, M.P.

Study of the mechanism of nickel reduction by hypophosphite with the use of deuterium as tracer. Part 2: Reduction of nickel in hypophosphite solutions with organic acid salts added. Zhur.fiz.khim. 37 no.10:2214-2219 O '63. (MIRA 17:2)

1. Institut fizicheskoy khimii AN SSSR.

GORBUNOVA, K. M.; LYAMINA, L. I.

"On the reduction of iron in alkaline solutions."

report presented at 15th Mtg, Intl Comm of Electrochemical Thermodynamics & Kinetics, London & Cambridge, UK, 21-26 Sep 1964.

Karpov Physico-Chemical Inst, Moscow.

SUTYAGINA, A.A.; GORBUNOVA, K.M.

Mechanism of phosphorus inclusion in the chemical reduction of some metals by hypophosphite. Zhur. prikl. khim. 37 no.8:1676-1681 Ag '64. (MIRA 17:11)

GORBUNOVA, K.M.; NIKIFOROVA, A.A.; POLYAKOV, Yu.M.; MOISEYEV, V.F.

Magnetic properties of nickel reduced by hypophosphite from alkaline solutions. Zhur. fiz. khim. 38 no.6:1580-1586 Je '64. (MIRA 18:3)

1. Institut fizicheskoy khimii AN SSSR, Moskva.

LYAMINA, L.I.; GORBUNOVA, K.M.

Mechanism of iron reduction from alkaline solutions. Part 1: Reduction of iron from alkali solutions saturated with hydrated iron oxide and from corresponding suspensions. Elektrokhimiia 1 no.1:41-45 Ja '65. (MIRA 18:5)

1. Institut fizicheskoy khimii AN SSSR.